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# SFE2000/SFE2000P Fast Ethernet Switch Reference Guide

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LINKSYS ONE COMMUNICATIONS SOLUTION

CISCO SYSTEMS

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## Document Revision History

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# Getting Started

This section provides an introduction to the user interface, and includes the following topics:

- Starting the Application
- Understanding the Interface
- Using the Linksys Management Buttons
- Using Screen and Table Options
- Resetting the Device
- Logging Off The Device

## Starting the Application

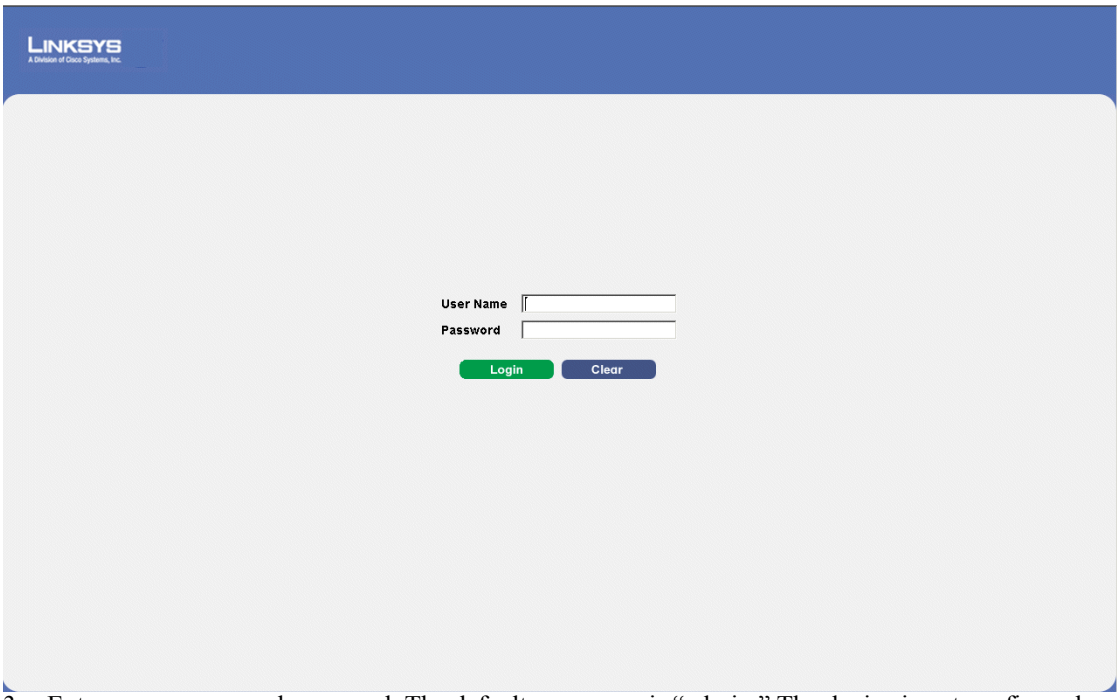
This section contains information for starting the Linksys User Interface.

**Note** By default, the IP address of the device is assigned dynamically. The IP address can be changed. It is recommended to configure the IP address statically, if the system is in stack mode, in order to prevent the user from disconnecting from the network in the event of master switchover.

To open the User Interface:

1. Open a web browser.
2. Enter the device's IP address in the address bar and press Enter. An Appendix 1, "Enter Network Password Page" opens:

***Enter Network Password Page***

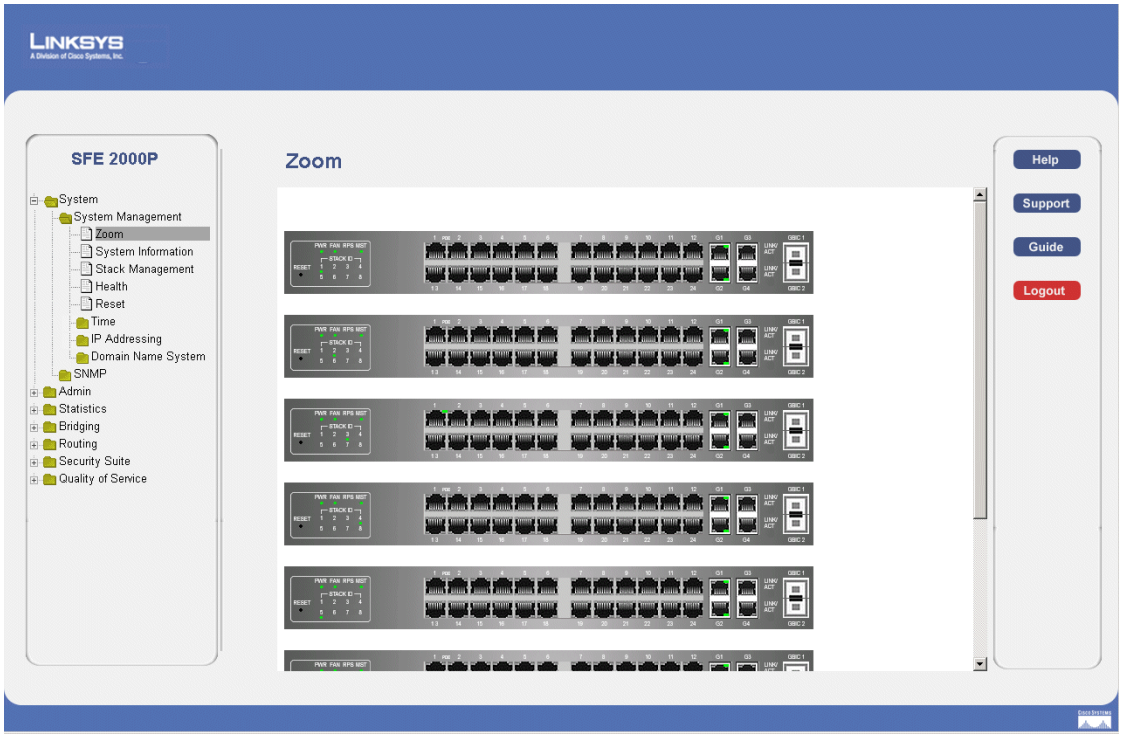



3. Enter a user name and password. The default user name is “admin.” The device is not configured with a default password, and can be configured without entering a password. Passwords are both case sensitive and alpha-numeric.

4. Click Login The *Embedded Web System Home Page* opens:

**Note** If you have logged in automatically via the Service Router user interface, the Tree and Device views appear and allow you to navigate through the various areas of the web interface. However, the following page will appear within the frame provided by the Service Router user interface.

***Embedded Web System Home Page***



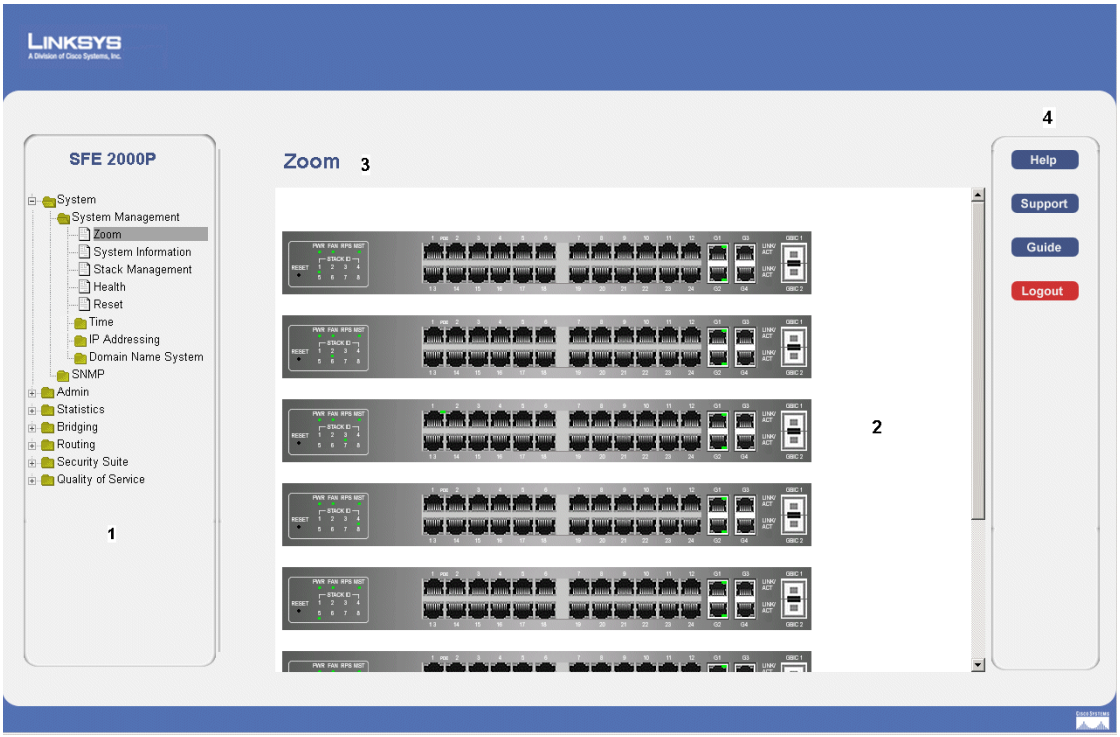
# Understanding the Interface

The following table lists the interface components with their corresponding numbers:

**Interface Components**

| Component | Description |
|---|---|
| 1 Tree View | The Tree View provides easy navigation through the configurable device features.The main branches expand to provide the subfeatures. |
| 2 Device View | The device view provides information about device ports, current configuration and status, table information, and feature components.The device view also displays other device information and dialog boxes for configuring parameters. |
| 3 Table Area | The Table area enables navigating through the different device features. Click the tabs to view all the components under a specific feature. |
| 4 EWS Information | The EWS information tabs provide access to the online help, contains information about the EWS. |

***Linksys User Interface Components***



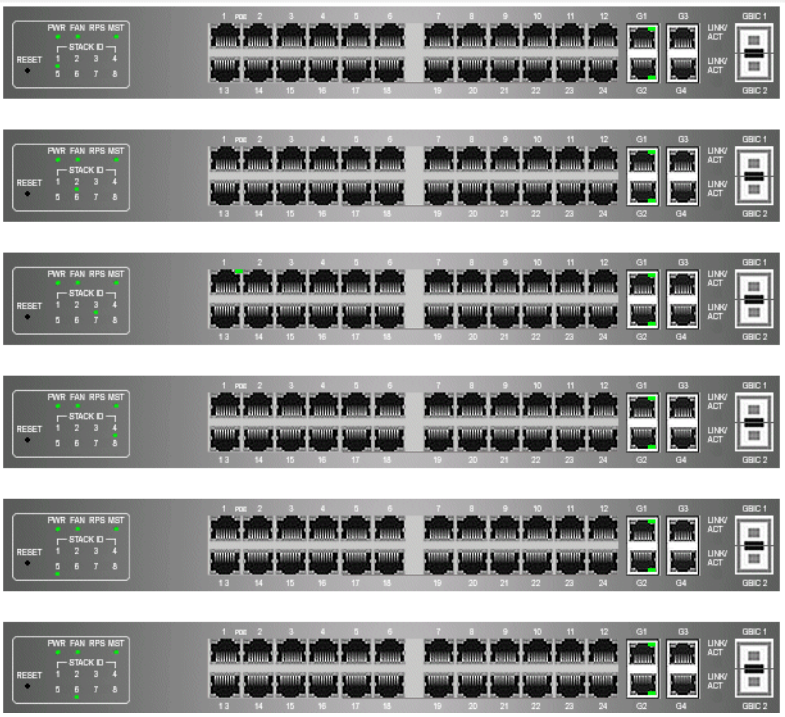
This section provides the following additional information:

- **Device Representation —** Provides an explanation of the Linksys user interface buttons, including both management buttons and task icons.
- **Using the Linksys Management Buttons —** Provides instructions for adding, modifying, and deleting device parameters.

## Device Representation

The Linksys home page displays a graphical representation of the device:

***Device Representation***



The Linksys home page contains a graphical SFE2000 and SFE2000P front panel illustration.

# Using the Linksys Management Buttons

Device Management buttons and icons provide an easy method of configuring device information, and include the following:

***Device Management Buttons***

| Button Name | Button | Description |
|---|---|---|
| **Apply** | | Applies changes to the device. |
| **Clear All Counters** | | Clears statistic counters |
| Clear Logs | | Clears log files |
| Add | | Opens an Add page |
| Delete | | Removes entries from tables |
| Reset the settings of Selected Port to Default | | Resets the settlings of a selected port to the default settings |
| Test Now | | Performs cable tests. |

# Using Screen and Table Options

Linksys contains screens and tables for configuring devices. This section contains the following topics:

- Appendix 1, "Adding Device Information"
- Appendix 1, "Modifying Device Information"
- Appendix 1, "Deleting Device Information"

## Adding Device Information

User defined information can be added to specific EWS pages, by opening a new Add page. To add information to tables or EWS pages:

1. Open an EWS page.
2. Click the **Add** button. An add page opens, for example, the *Add SNTP Server Page*:

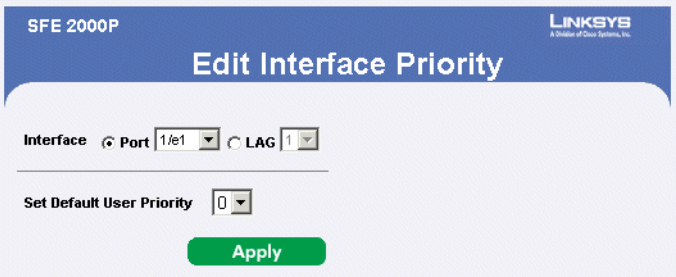
***Add SNTP Server***

3. Define the fields.
4. Click **Apply**. The configuration information is saved, and the device is updated.

## Modifying Device Information

1. Open the EWS page.
2. Select a table entry.
3. Click the **Edit** Button. A Modify page opens, for example, the *Interface priority Page* opens:

*Edit Interface Priority*




4. Define the fields.
5. Click **Apply**. The fields are modified, and the information is saved to the device.

## Deleting Device Information

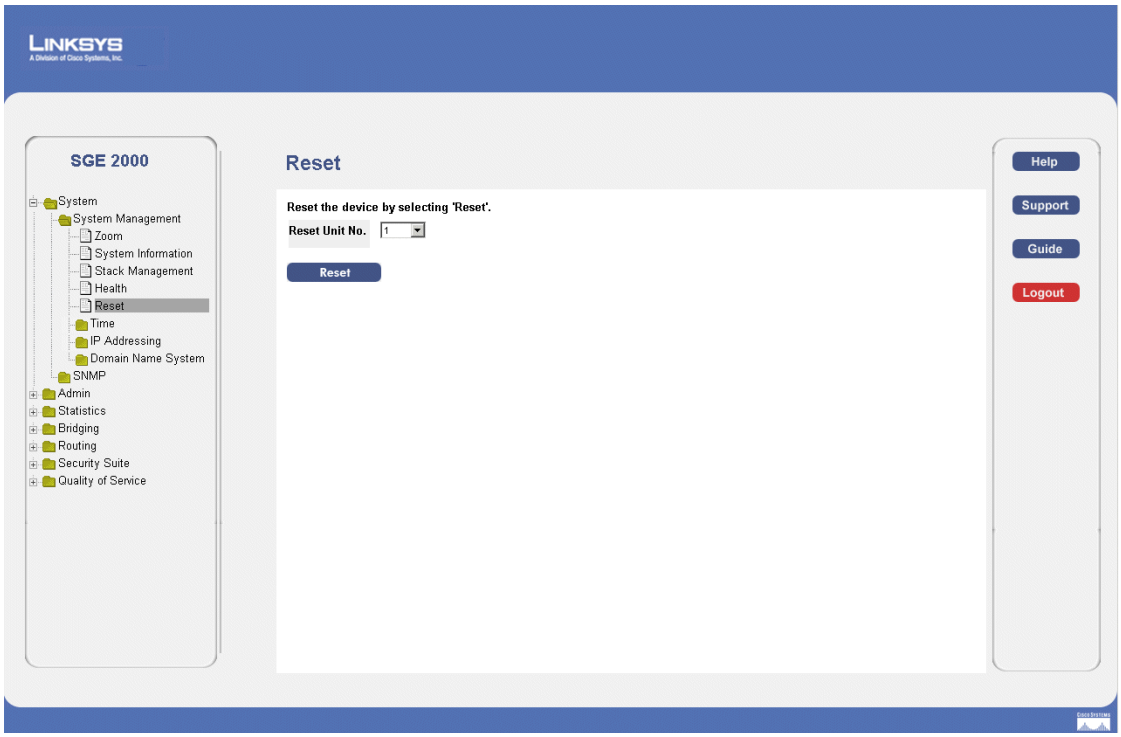
1. Open the EWS page.
2. Select a table row.
3. Check the Remove checkbox.
4. Click the Delete button. The information is deleted, and the device is updated.

# Resetting the Device

The *Reset* page enables the device to be reset from a remote location. Save all changes to the Running Configuration file before resetting the device. This prevents the current device configuration from being lost. To reset the device:

1. Click **System > General > Reset**. The *Reset* page opens.

***Reset Page***




2. Click the **Reset** button. Each unit can be reset individually. Resetting the stack master results in resetting the entire stack. If the master unit is reset, the device is reset, and a prompt for a user name and password is displayed.

3. Enter a user name and password to reconnect to the Web Interface, if the stack is not part of a full Linksys One system. If the stack is part of a Linksys One system, login is automatically done from the Service Router.

# Logging Off The Device

1. Click Logout. The system logs off. The *Embedded Web System Home Page* closes.

# Managing Device Information

This section provides information for defining both basic and advanced system information. This section contains the following topics:

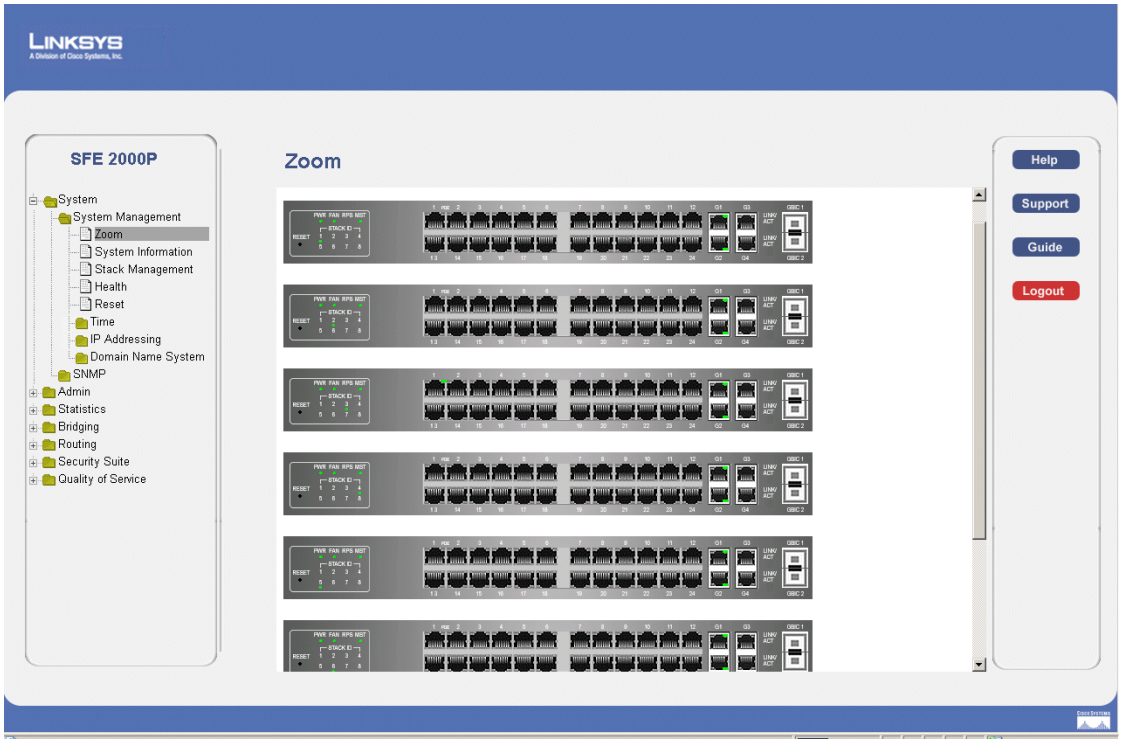
- Understanding the Device Zoom View
- Defining General System Information
- Managing Stacks

## Understanding the Device Zoom View

The *Zoom Page* is the main window used for viewing the devices either in stand-alone mode or operating in a stack. To open the Zoom Page:

1. Click the **System** > **System Management** > **Zoom**. The *Zoom Page* opens:

***Zoom Page***




The Zoom Page contains the following port indicators:

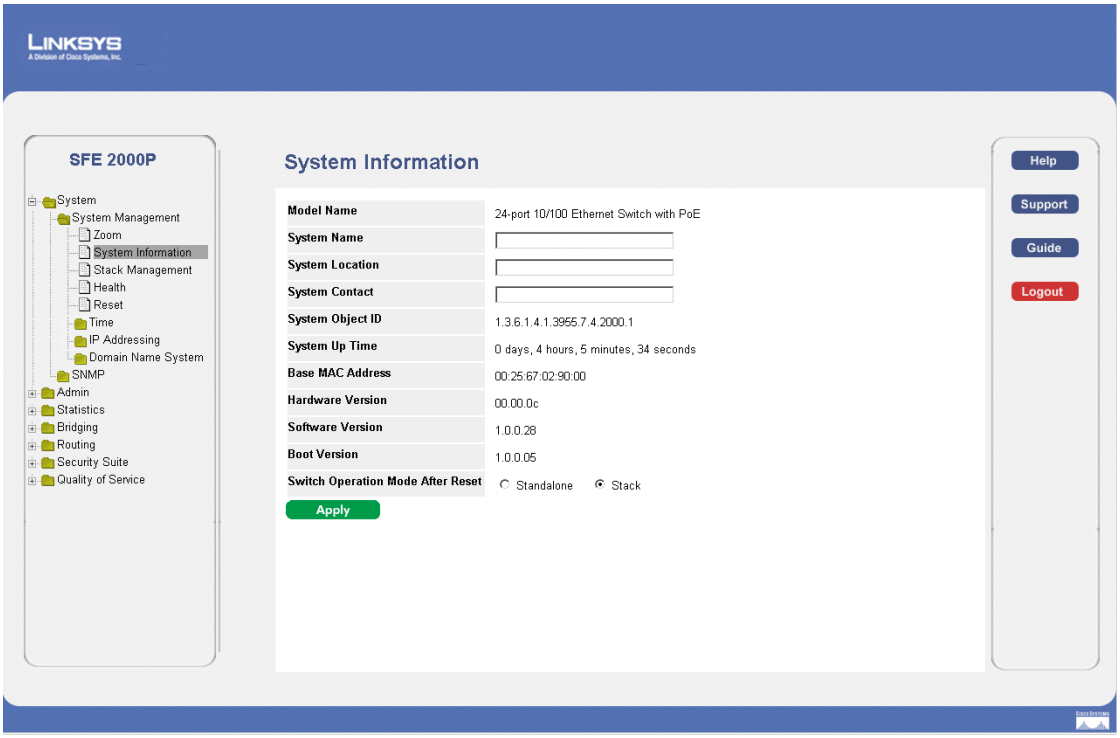
- **Green —** Indicates the port is currently operating.
- **Red —** indicates the port is not currently operating.

# Defining General System Information

## SFE 2000P System Information

The *System Information page* contains parameters for configuring general device information.

***SFE 2000P System Information Page***




The *System Information page* contains the following fields:

- **Model Name** — Displays the user defined user name.
- **System Name** — Displays the user configured name of the system. Configured in the Network page.
- **System Location** — Defines the location where the system is currently running. The field range is up-to 0-160 Characters.
- **System Contact** — Defines the name of the contact person.The field range is up to 0-160 Characters.
- **System Object ID**— Displays the vendor's authoritative identification of the network management subsystem contained in the entity.
- **System Up Time** — Displays the amount of time that has elapsed since the last device reset. The system time is displayed in the following format: Days, Hours, Minutes and Seconds. For example: 41 days, 2 hours, 22 minutes and 15 seconds.

- **Base MAC Address** — Displays the device MAC address. If the system is in stack mode, the Base MAC Address of the master unit is displayed.
- **Hardware Version** — Displays the hardware version number. If the system is in stack mode, the hardware version of the master unit is displayed.
- **Software Version** — Displays the software version number. If the system is in stack mode, the version of the master unit is displayed.
- **Boot Version** — Indicates the system boot version currently running on the device. If the system is in stack mode, the version of the master unit is displayed.
- **Switch Operation Mode After Reset** — Indicates the mode the device operates in after the system is reset. A switch may operate in one of two modes: stack or standalone. Either mode is selected by the user during software boot or in the web interface's System Information page. The new mode takes effect after the unit is reset. The factory default is stack mode. The possible field values are:
  - *Standalone* — Indicates the device operates as a Standalone device after the system is reset. A switch operating in standalone mode runs as an independent, single unit. All ports of a standalone switch operate as normal Ethernet links. A standalone switch does not participate in a stack even if physically connected to a stack.
  - *Stack* — Indicates the device operates as a Stacked unit after the system is reset. A switch operating in stack mode is not an independent unit, but a member of an organized group of switches known as a stack. A stack consists of one Stack Master control switch, one Master Backup switch and up to six Stack Member switches. In some cases, a unit in stack mode that is not connected to any other units may operate as a "stack–of-one."

2. Define the relevant fields.
3. Click **Apply**. The system information is defined, and the device is updated.

# Managing Stacks

Stacking allows you to build a switch with many more ports than would be available in a single unit. The stack is managed by one of the units (called the Stack Master) and all of the other units serve as ports only.

You can build stacks by building a new stack from a group of switches, or adding new units to an existing stack. Stacks can be automatically or manually configured.

**NOTE:** Two ports of each unit in a stack mode (ports 12 and 24 on GE units, and ports G1 and G2 on FE units) are reserved for stacking links, and cannot be used for regular network connections.

# Building Automatically-Configured Stacks

## Building a New Stack

The easiest way to build a stack is to use a group of switches, each of which is in factory default mode:

**NOTE:** If the units to be used in building the new stack have been used previously, we recommend that you reset them to the factory default by holding the reset button for at least 10 seconds before using them.

1. Connect the units physically through the stacking ports, using standard Ethernet cables.
2. Power the units on. After a short interval the stack becomes operational, with one of the units selected as the Stack Master. The unit selected as Stack Master is indicated by a lit green “MST” LED on its front panel. If a serial console connection is desired, the serial cable should be connected to the console port of the unit serving as the Stack Master.

## Adding Units to a Running Stack

1. Reset the units that will be added by restoring them to the factory default mode. Connect the units physically to the stack.
2. Power the units on. After a short interval, they will become members of the stack.

# Building Manually-Configured Stacks

You can manually configure stacks, including choosing a specific unit as the Stack Master. You must assign a unique Unit ID (from 1 to 8) to each stack member.

## Building a New Stack

1. Reset all relevant units to by restoring them to the factory default mode.
2. Connect the units physically through the stacking ports, using standard Ethernet cables.
3. Assign each unit its desired number, making sure no duplicates exist, and reset the stack.

## Adding Units to a Running Stack

1. Reset the units to be added by restoring them to the factory default mode.
2. Connect the units physically to the stack.

3. Power the units on. After a short interval, they will become stack members, but will have automatically-assigned Unit IDs. Assign each such unit its desired Unit ID (using the Stack Management Interface through the console port, by Telnet, or by using the graphical user interface (GUI).

4. Reset the units to make this assignment permanent.

**NOTE:** We recommended that if you manually assign a Unit ID to one unit, you manually assign Unit IDs to all units. Using a mix of both system-assigned and manually-assigned IDs in your network can impact system performance.

The unit that is assigned the Unit ID 1 is the Stack Master, and its front panel "MST" LED lights green. The unit assigned the Unit ID 2 is the Backup Master.

# Understanding Stack Resiliency

Stacks can be configured in ring or chain topologies. We recommend configuring the stack in ring topology, due to the high resiliency in case of unit failure or stacking links failure.

Additionally, if a redundant power supply is present, we recommend connecting the Stack Master and Backup Master units to the redundant power supply.

# Understanding Advanced Stacking

To understand advanced stacking, you must understand Unit IDs and how they are allocated, and the stack unit startup process.

## Unit IDs

Each unit in a stack has an assigned unique Unit ID number. The following sections describe the Unit IDs and their characteristics.

### Stack Master

The unit assigned the Unit ID number 1 serves as the Stack Master. All other units are stack members. The Stack Master provides a single point of control, configuration and management for the entire stack, and stores the configuration for all stack members. (Members do not store any configuration information.)

### Stack Backup Master

The unit assigned the Unit ID number 2 is a special stack member that serves as the stack Backup Master. A stack Backup Master assumes the role of Stack Master for the remaining stack members if the stack Master fails or is disconnected.

The Stack Master stores a copy of the active configuration on the Backup Master. This copy is used only if the Backup Master assumes the role of Stack Master.

**NOTE:** Only the configuration file is copied. Any dynamically-filled tables (for example, learned addresses) are not copied from the Stack Master to the Backup Master. If the Backup Master assumes the role of Stack Master, it builds its own dynamic tables.

### Stack Members

The units assigned the Unit IDs 3 through 8 are called stack members. A stack member operates only as a member of the stack under the direction of an operational Stack Master (or a Backup Master that has assumed the Stack Master role). Stack members are not directly manageable and configurable, and must be managed through the Stack Master. They do not contain any meaningful configuration information, including their own configuration. If an operational Stack Master is not present and reachable, these units are not functional.

### Master-Enabled Units

Units that are assigned a Unit ID number of 1 or 2 are called master-enabled units. Only master-enabled units participate in the Master Election process (see below) when they are initialized, are inserted into a new stack, or lose connectivity with the existing Stack Master. Only master-enabled units participate in the Master Election process and can become the Stack Master or Backup Master. (Units that are assigned a Unit ID of 3 through 8 can only become a Stack Master or a Backup Master if they are manually configured by the system administrator or if they are reset to the factory default mode.)

### Unit ID Allocation

Units are shipped from the factory without an assigned Unit ID, and must be assigned a unique Unit ID before they can operate as part of a stack. Unit ID numbers are assigned to units in one of two ways:

- Unit ID numbers are assigned by the system administrator, and can be changed only manually by the system administrator.
- Unit ID numbers are allocated to a stack member unit by the Stack Master during system initialization.

A unit that was assigned a Unit ID will usually keep this number even after it is rebooted. The Stack Master may reallocate Unit IDs during system initialization to resolve duplicate Unit ID conflicts (see below). Manually assigned Unit IDs cannot be changed by the Stack Master, even if there is a conflict.

Unit ID assignment or change takes effect only during system initialization and does not take place during system runtime. Units of a stack do not have to be numbered in sequence, and can be interconnected as long as each unit has a unique ID and at least one unit of the stack serves as Stack Master.

## Stack Unit Startup Process

When a unit in stack mode is initialized (powered up or rebooted), it goes through the following steps:

1. The Master Discovery and Master Election processes.
2. Unit ID allocation by the Stack Master (including duplicate Unit ID conflict resolution).
3. Unit and port configuration by the Stack Master.

### Master Discovery Process

When a unit in stack mode initializes, its behavior depends on its Unit ID (if one is configured):

- If the unit does not have a current Unit ID (that is, the unit is in factory default mode) and if there is a Stack Master, the unit is allocated a Unit ID number from the Stack Master. If there is no Stack Master, then the unit participates in the Master Election process, and may be chosen as the new Stack Master or Backup Master.
- If the unit's current Unit ID is 1 or 2 (that was previously allocated, even if used in a different stack), then the unit participates in the Master Election process.
- If the unit has a current Unit ID (that was previously allocated, even if used in a different stack), the unit tries to act according to its Unit ID number in the new stack. For example, if the unit's current Unit ID is 3 through 8, it will try to connect to the running Stack Master, and will not proceed to the next stage until contact with the Stack Master is made. These units will not participate in the Master Election process, and if no Stack Master is present, the units are effectively shut down.

The Stack Master and all other stack units carry out a continuous process of Master Discovery by frequently exchanging stack control messages. This allows units to know if another unit fails or becomes unreachable.

### Master Election Process

When units in stacking mode initialize, one of the units is elected as the Stack Master. If a unit in the stack was set to "Force Master" by the system administrator, that unit is elected as the Stack Master. Only master-enabled stack units (for example, those with the Unit ID of 1 or 2) can be configured as "Force Master."

If the stack contains units whose unique Unit ID is 1 or 2, then one of these two units will be the Stack Master. It does not matter if the Unit ID was originally assigned automatically or manually. These units are called master-enabled units. If there is only one master-enabled unit, it will be elected as the Stack Master (even if its Unit ID is 2).

If there are two master-enabled units, the two units decide which of them is the Master by checking which one has been running for a longer time (in intervals of 10 minutes). The unit that has been running for the longer time will be the Stack Master. If they have been running for the same amount of time, the unit with the Unit ID of 1 will be the Stack Master. If both units have been running for the same amount of time and both units have the same Unit ID, the unit with a lower MAC (hardware) address will be selected as the Stack Master.

If the stack contains one or more units without a current Unit ID (the units are in factory default mode), then one of these units will be the Stack Master. The unit selected to be the Stack Master is the one running for the longest time (in intervals of 10 minutes), or, if all units are running for the same amount of time, the one with the lowest MAC (hardware) address.

The Master Election process ensures that the stack has a Stack Master. The Stack Master has the Unit ID of 1 and the Backup Master, if it exists, has the Unit ID of 2. Alternatively, the Stack Master has the Unit ID of 2 and the Backup Master, if it exists, has the unit ID of 1.

If a master-enabled unit is added to a stack and powered on, when it comes up it invokes the Master Election process, even though the rest of the stack already has an elected master. Because the unit is new, it loses the election and joins as a stack member or Backup Master.

### Unit ID Allocation and Duplicate Unit ID Conflict Resolution

After a Stack Master is elected, it allocates Unit IDs to units that do not have a currently assigned Unit ID (units that are in factory default mode). The Stack Master also attempts to resolve all cases of units with duplicate Unit IDs. The Stack Master changes the Unit IDs of units that have a duplicate current Unit ID, provided that there are available, unused Unit IDs. In a merged stack, if the Stack Master unit remains as the Stack Master, units that were in its group will keep their unit IDs. Members of other groups are renumbered.

If the conflict occurs after the units reboot, the conflict is resolved as follows:

- If both duplicate units are in auto (self ordering) mode, then the unit ID with the lower MAC (hardware) address will keep its unit ID. The other unit is assigned a new unit ID.
- If one of the duplicates is in auto (self ordering) mode, and the other unit is in manual mode, then the manual mode unit will keep its ID and the other is assigned a new unit ID.
- If both duplicate units are in manual mode, then both of them are shut down.

If the Stack Master is able to allocate a unique Unit ID to each unit, then all units can operate as a stack. If the Stack Master is unable to allocate a Unit ID to a unit, that unit is effectively shut down and will not participate in the stack. For example, units with a conflicting manually-set Unit ID number are shut down because the Stack Master cannot override the system administrator’s assignment and resolve the conflict.

If there are more units than the maximum number allowed in a stack, and the incoming units are already in factory default mode (they do not have unit ID assigned), then a Stack Master is elected following the Master Discovery and Master Election processes. All other units remain shut down.

Occasionally, due to a race condition during the boot process, some of the units might be connected and join the stack. If the incoming units already have a unit ID, then none of them will join the stack and all are left in shutdown mode because there is no way for the Stack Master to determine their Unit ID preference.

**NOTE:** If a unit is shut down, its stacking links are inactive. If the stacking units are connected in a chain topology, the shutdown of one unit breaks the chain and can cause other units to be shut down if they have no active link to the Stack Master unit.

# Configuring Units and Ports

After the Master Discovery and Master Election processes, each unit in the stack has a unique Unit ID, one of the units is the Stack Master, and one of the units may serve as the Backup Master. The Stack Master then configures each of the member units and its ports according to the configuration file present on the Stack Master. If the stack has a Backup Master, the configuration file is copied to the Backup Master.

After all the units and ports are configured, the stack enters normal operational mode. If a change is made to the system configuration, the change is stored by the Stack Master and is copied to the Backup Master if one exists.

You can use the command-line interface (CLI) or GUI to configure the stack units.

## Setting the Unit's Operational Mode

Use the GUI to set the unit's operational mode to standalone or stack. This configuration takes effect after the next reboot.

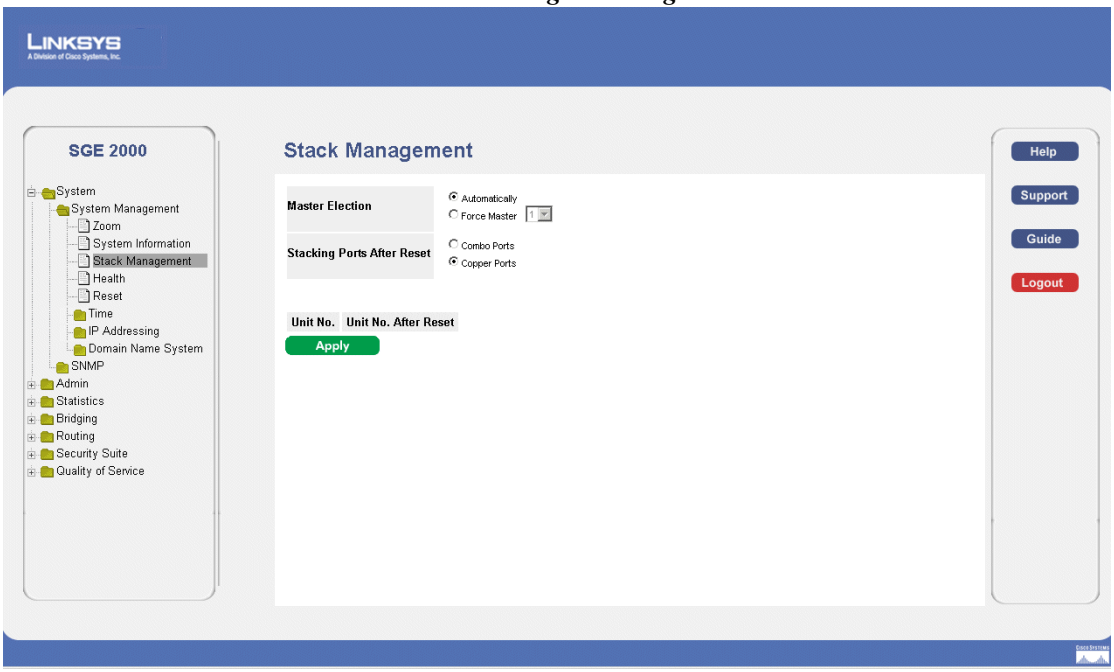
## Configuring the Stack Master and Unit ID

The *Stack Management Page* allows network managers to either reset the entire stack or a specific device. Device configuration changes that are not saved before the device is reset are not saved. If the Stack Master is reset, the entire stack is reset.

To open the *Stack Management Page*:

1. Click **System > System Management > Stack Management**. The *Stack Management Page opens:*

***Stack Management Page***



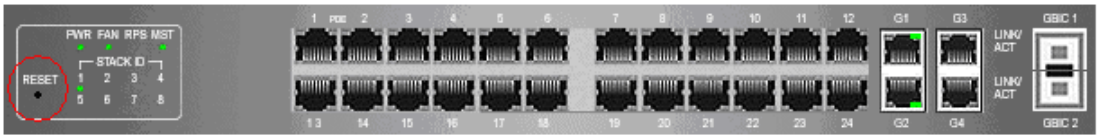

The *Stack Management Page* contains the following fields:

- **Master Election** — Indicates the method of electing the Stack Master device. The possible values are:
  - *Automatically* — The master is selected automatically by software.
  - *Force Maste*r — The unit is forced to be master of the stack. Note that only units with the Unit ID of 1 or 2 can be the stack master.
- **Stacking Ports After Reset** — Allows the user to decide what cable type is in use. The possible values are:
  - *Combo Ports* — Indicates that the combo port is used as the stacking port.
  - *Copper Ports* — Indicates that the copper port is used as the stacking port.
- **Unit No.**— Displays the current Stacking Master.
- **Unit No. After Reset** — Indicates the stacking member elected Stacking Master after the device is reset.

2. Define the relevant fields.
3. Click **Apply**. Stack management is defined, and the device is updated.

### Resetting the Unit to Factory Default Mode

To reset the unit to the factory default settings, press the front panel RESET button (see Figure 3.) The unit is set to Stack mode with a Unit ID of 0.




### Understanding LED Indicators

Each unit contains a Master LED indicator and eight unit LEDs. The LED status definitions are shown in the table below.

| LED | Mode | Color | Description |
|---|---|---|---|
| Master | Solid | Green | The switch is the Stack Master. |
| | Off | N/A | The switch is not the Stack Master or the switch is not stacked. |
| ID *n* | Solid | Green | The switch is Unit ID *n*. |
| | Off | N/A | The switch is not Unit ID *n* or the switch is not stacked. |
| All ports | Solid | Red | The switch is powered on, but not operational. |

## Stack Troubleshooting and Maintenance

### Replacing a Failed Member Stack Unit in an Operational Stack

If a unit that is not the Stack Master fails in an operational stack, the Stack Master discovers that the unit is no longer responding during the Master Discovery process. The Stack Master directs all other stack members to route unit-to-unit traffic around the failed unit using the ring topology of the stacking connections. Concurrently, the Stack Master notifies the system administrator of the failure by sending SYSLOG messages and SNMP traps.

Because all traffic has been routed around the failed unit, when it is disconnected from the stack, the stack continues to run as long as all other stacking connections are left intact.

When a new unit is inserted in the stack and powered on, the following occurs:

1. The incoming unit, which is in stack mode, performs the Master Discovery process, and may participate in the Master Election process.

    - If the incoming unit has a Unit ID of 1 or 2 (it is a master-enabled unit) it initiates the Master Election process. However, because the running Stack Master has a longer runtime, the current Stack Master retains its position and the incoming unit does not become the new Stack Master.

    - If the incoming unit has a Unit ID of 3 through 8, it attempts to become a member unit of the stack, subject to control by the already running Stack Master, and the Master Election process does not occur.

2. The Stack Master performs Unit ID allocation and the conflict resolution process.

    - If the incoming unit did not have an assigned Unit ID (that is, it is in factory default mode), it is assigned the lowest available Unit ID by the Stack Master. We recommend that you use the automatically-assigned unit ID mode because it provides better resiliency to the stack.

    - If the incoming unit already has an assigned Unit ID, and that Unit ID is unused in the current stack, the incoming unit keeps its assigned Unit ID and the Stack Master applies any configuration relevant to that Unit ID to the incoming unit.

    - If the incoming unit already has an assigned Unit ID, and that Unit ID conflicts with a unit ID in the current stack, the Stack Master allocates a new Unit ID to the incoming unit, giving it the lowest available Unit ID. However, if the incoming unit has a manually assigned Unit ID, the Stack Master cannot change it. If the incoming unit cannot be assigned an available Unit ID, then it is shut down and is not joined to the stack.

3. The Stack Master performs unit and port configuration for the incoming unit.

    - Any configuration information that is relevant to the number assigned to the incoming unit is applied by the Stack Master. For example, if the incoming unit is assigned the same Unit ID of the unit it replaced, then when possible, it receives the same configuration as the failed unit.

    - If the incoming unit is identical to the replaced unit, the entire configuration of the replaced unit is applied to the incoming unit and the stack returns to the state it was in before unit failure.

If the incoming unit is not identical to the unit that failed, the Stack Master applies the configuration in the following manner:

- If a 24-port unit replaces a failed 48-port unit, the ports of the incoming unit are configured according to the configuration of the first 24 ports of the failed unit.

**NOTE:** The configuration of all 48 ports of the failed unit is kept in memory, even though the first 24 are currently applied. If, in the future, a 48 port unit is inserted and assigned the same Unit ID, it is configured the same as the original failed 48-port unit.

- If a 48-port unit replaces a 24-port unit, then the first 24 ports of the incoming unit are configured according to configuration of the ports of the failed unit. The remaining ports of the incoming are configured according to the default settings.

- If the units have uplink ports, then the first uplink port of the incoming unit is configured according to the configuration of the first uplink port of the failed unit.

## Replacing a Failed Stack Master Unit in an Operational Stack

When the Stack Master unit fails, the stack Backup Master, using the Master Discovery process, discovers that the Stack Master unit no longer responds. The Backup Master takes over as the Stack Master. The Backup Master (now the Stack Master) directs all other stack members to route unit-to-unit traffic around the failed unit using the ring topology of the stacking connections. Concurrently, the Backup Master notifies the system administrator of the failure by sending SYSLOG messages and SNMP traps.

Because all traffic has been routed around the failed unit, when it is disconnected from the stack, the stack continues to run as long as all other stacking connections are left intact.

When a new unit is inserted in the stack and powered on, the following occurs:

1. The incoming unit, which is in stack mode, performs the Master Discovery process, and may participate in the Master Election process.

    - If the incoming unit has a Unit ID of 1 or 2 (it is a master-enabled unit) it initiates the Master Election process. However, because the running stack Backup Master has a longer runtime (if it has been running for more than 10 minutes) it remains the Stack Master and the incoming unit does not become the new Stack Master. This can cause an incoming unit with a Unit ID of 1 to serve as the stack Backup Master, while the current unit with the Unit ID of 2 remains the active Stack Master.

2. The Stack Master performs Unit ID allocation and the conflict resolution process.

    - If the incoming unit did not have an assigned Unit ID (that is, it is in factory default mode), it is assigned the lowest available Unit ID by the Stack Master. We recommend that you use the automatically-assigned unit ID mode because it provides better resiliency to the stack.

    - If the incoming unit already has an assigned Unit ID, and that Unit ID is unused in the current stack, the incoming unit keeps its assigned Unit ID and the Stack Master applies any configuration relevant to that Unit ID to the incoming unit.

    - If the incoming unit already has an assigned Unit ID, and that Unit ID conflicts with a unit ID in the current stack, the Stack Master allocates a new Unit ID to the incoming unit, giving it the lowest available Unit ID. However, if the incoming unit has a manually assigned Unit ID, the Stack Master cannot change it. If the incoming unit cannot be assigned an available Unit ID, then it is shut down and is not joined to the stack.

3. The Stack Master performs unit and port configuration for the incoming unit.

    - Any configuration information that is relevant to the number assigned to the incoming unit is applied by the Stack Master. For example, if the incoming unit is assigned the same Unit ID of the unit it replaced, then when possible, it receives the same configuration as the failed unit.

    - If the incoming unit is identical to the replaced unit, the entire configuration of the replaced unit is applied to the incoming unit and the stack returns to the state it was in before unit failure.

## Splitting a Stack

A working stack can be split into two groups, either by failure of a stacking link connecting two units in the stack, or by a failed unit in a chain topology that causes disconnection between two units in the stack. In this case, each group is considered as an independent running stack configuration. For each group, there are three scenarios.

### The Stack Master and Backup Master Units Remain in a Group

In this scenario, the Stack Master routes around the missing units. The Master Discovery, Master Election and Unit ID Allocation & Duplicate Unit ID Conflict Resolution processes occur with the following results:

- Any configuration information contained in the Stack Master that is relevant to the units which remained in the split group remains unchanged.

- Topology information (the information for each unit on how to send traffic to any other unit in the stack) managed by the Stack Master includes only units that are reachable (connected) following the split.

- The split stack continues to work as it previously did, but with fewer units.

    - No unit ID changes are performed in each of the split stacks.

    - The Stack Master notifies the system administrator of the removed units and ports that belong to the unreachable units by sending SYSLOG messages and SNMP traps. They are reported as “not present.”

### The Stack Master or the Backup Master Unit Remains in a Group

If the Stack Master unit remains in the group, the scenario described in “Replacing a Failed Member Stack Unit in an Operational Stack” applies. If the Backup Master unit remains in the group, the scenario described in “Replacing a Failed Stack Master Unit in an Operational Stack” applies.

**NOTE:** If the stack is split in two groups, one with the Stack Master and one with the Backup Master, both groups will function.

The Master Discovery, Master Election and Unit ID Allocation & Duplicate Unit ID Conflict Resolution processes occur with the following results:

- If the Stack Master unit remains in the split stack, the Stack Master discovers (using the Master Discovery process) that the Master Backup unit no longer responds. The Stack Master notifies the system administrator (using SYSLOG messages and SNMP traps) of the removed units and ports that belong to the unreachable units and they are reported as "not present."
- If the Backup Master unit remains in the split stack, the Backup Master determines this as a case of Stack Master failure and takes over and manages the remaining units as a stack while keeping its previous Unit ID number. Because the Backup Master was not acting as a master prior to the split, it initiates a topology database and ports learning process. Traffic might be halted for a short period of time until synchronization (unit and port configuration) is completed. New units discovered by the Backup Master notify the system administrator (using SYSLOG messages and SNMP traps).
- The partial stacks both continue to work as they did previously, but with fewer units.
- No unit ID changes are performed in each of the partial stacks.
- If each part of the stack has a Stack Master (for example, one contains the original Stack Master, and one contains the Backup Master), and are operating as two separate stacks, both Stack Masters contain the same configuration and use the same IP address.

**CAUTION:** If both Stack Masters use the same IP Address, problems can occur on the network, because users cannot connect to one of the stacks through its IP address.

### Neither the Stack Master Unit or the Backup Master Unit Remains in the Group

This scenario is the same as that of a failed Stack Master where no Backup Master is available. The following concepts apply:

- Units whose ID numbers are 3 through 8 in this part of the original stack will not renumber themselves, and will remain shut down until a master-enabled unit is connected and begins to operate as the Stack Master. The Master Discovery process discovers that the Stack Master has failed.
- In this group, the units lose connection with the Stack Master. Since they began as a running stack and none of them are in factory default mode, renumbering does not occur, and even a reset of the units will not affect unit ID assignment, because units can be renumbered only by a Stack Master.
- No unit ID changes are performed in each one of the two groups.

**NOTE:** None of the units in either group will renumber themselves.

## Merging Two Stacks

To merge two working stacks and create one stack, first decide if you will merge the stacks while the incoming units are powered off during insertion, or if both stacks will be running when merged.

If the incoming units are powered off, follow the procedures described in “Building a New Stack” in the “Building Automatically-Configured Stacks” or “Building Manually-Configured Stacks” sections. Repeat the process for each unit inserted into the stack.

If both stacks to be merged are running (for example, you are connecting the stacking cables of two stacks), the following occurs:

- If each of the joined stacks has a Stack Master unit, both Stack Master units perform the Master Discovery process and participate in the Master Election process. One of the Stack Master units is selected as the Stack Master unit for the merged stack. The criteria for choosing the Stack Master are as follows:
  - Force Master: If Force Master is enabled, the unit that is configured as the forced unit is selected as the Stack Master.
  - System Up Time: Up time is measured by quantities of 10-minute intervals. If the number of 10 minute intervals is higher for one of the units, this unit is selected as the Stack Master.
  - Lowest Unit ID: If both units have the same up time (measured in intervals of 10 minutes), the unit with the lowest unit ID is selected as the Stack Master.
  - Lowest MAC: If both Master unit ID numbers are equal, the unit with the Lower MAC address is chosen as the Stack Master.

The Stack Master unit that loses its “mastership” in the Master Election process is renumbered if the unit ID was dynamically allocated. The new Stack Master allocates it a new number and configures it as a stack member or a Backup Master. It will be shut down if the unit ID was manually allocated. We recommend that the administrator configure the unit to receive an auto-assigned Unit ID before reconnecting it to the stack.

**NOTE:** There will never be two units with the same Unit ID at the end of the merge.

When two stacks are combined, all of the configuration information for one of the stacks is lost. Only the surviving Stack Master (after the discovery and election processes are complete) maintains its configuration information.

We recommend that when combining two stacks, you reset the switches in one stack to factory default mode and then add the switches as described in "Adding Units to a Running Stack" in the "Building Automatically-Configured Stacks" section.

- If one of the merged stacks had neither a Stack Master unit nor a Backup Master unit, then units belonging to this group are inserted into the stack as described in "Replacing a Failed Member Stack Unit in an Operational Stack." The Master either connects the running units to the stack using the current Unit ID numbers or renumbers them.

**NOTE:** Any time two stacks are combined into one stack, there is no way to maintain the configuration for both sets of switches. All dynamic information of the units that belong to the portion of the stack that was not re-elected to be the Stack Master is relearned.

## Understanding Stacking Cable Failure

If the stacking connection cables fail and cause a stack split, the scenario described in "Merging Two Stacks" applies. This occurs only if the stack uses a chain topology. Single stacking cable failure will not cause a stack split if a ring topology is used.

## Inserting Too Many Units into a Stack

If you try to insert too many units into a stack, when all units (existing and newly inserted) are powered on at the same time, the following occurs:

1. A Stack Master is elected following the Master Discovery and Master Election processes.
2. All other units are shut down.

**NOTE:** Occasionally, due to a race condition during the boot process, some of the units might be connected and join the stack.

When a running group of units is added to an existing stack and each one of the stack groups has an elected Stack Master, and the total of existing units and inserted units exceeds the maximum allowed number of units (8) in a stack:

- The Master Detection and Master Election processes determine the Stack Master out of one of the two combined stacking groups.
- When switches are added to a running stack, the Unit ID Allocation and Duplicate ID conflict resolution processes detect an error if too many switches are present in the stack, and no changes are made to units that originally belonged to the group managed by the newly-elected Stack Master. The original switches retain their ID assignments and configurations. The units that originally belonged to the group managed by the Stack Master that lost its "mastership" are shut down.

## Inserting a Standalone Unit into a Running Stack

If a unit is in standalone mode, it will not participate in the Master Discovery process (it will not look for a Stack Master and will not respond to master queries). As a result, it will not join the stack but will continue to run as a standalone unit. The ports that are connected to the other units' stacking links will not pass any traffic, and the Stack Master will consider them as failed stacking links and route all traffic around them.

## Viewing Device Health

The *Health Page* displays physical device information, including information about the device's power and ventilation sources.

1. Click **System** > **System Management** > **Health**. The *Health Page* opens:

***Health Page***

The *Health Page* contains the following fields:

- **Unit No. —** Indicates the unit number for which the device information is displayed.
- **Power Supply Status —** The power supply status. Power supply 1 is displayed as PS1 in the interface, while the redundant power supply is displayed as RPS.

- **Fan Status —** The fan status. The device has five fans. Each fan is denoted as fan plus the fan number in the interface. The possible field values are:
  - *OK* — The fan is operating normally.
  - *Fail* — The fan is not operating normally.

## Managing Power-over-Ethernet Devices

Power-over-Ethernet (PoE) provides power to devices over existing LAN cabling, without updating or modifying the network infrastructure. Power-over-Ethernet removes the necessity of placing network devices next to power sources.

Power-over-Ethernet can be used in the following applications:

- IP Phones
- Wireless Access Points
- IP Gateways
- PDAs
- Audio and video remote monitoring

Powered Devices are devices which receive power from the device power supplies, for example IP phones. Powered Devices are connected to the device via Ethernet ports. Guard Band protects the device from exceeding the maximum power level. For example, if 400W is maximum power level, and the Guard Band is 20W, if the total system power consumption exceeds 380W no additional PoE components can be added. The accumulated PoE components power consumption is rounded down for display purposes, therefore remove value after decimal point.

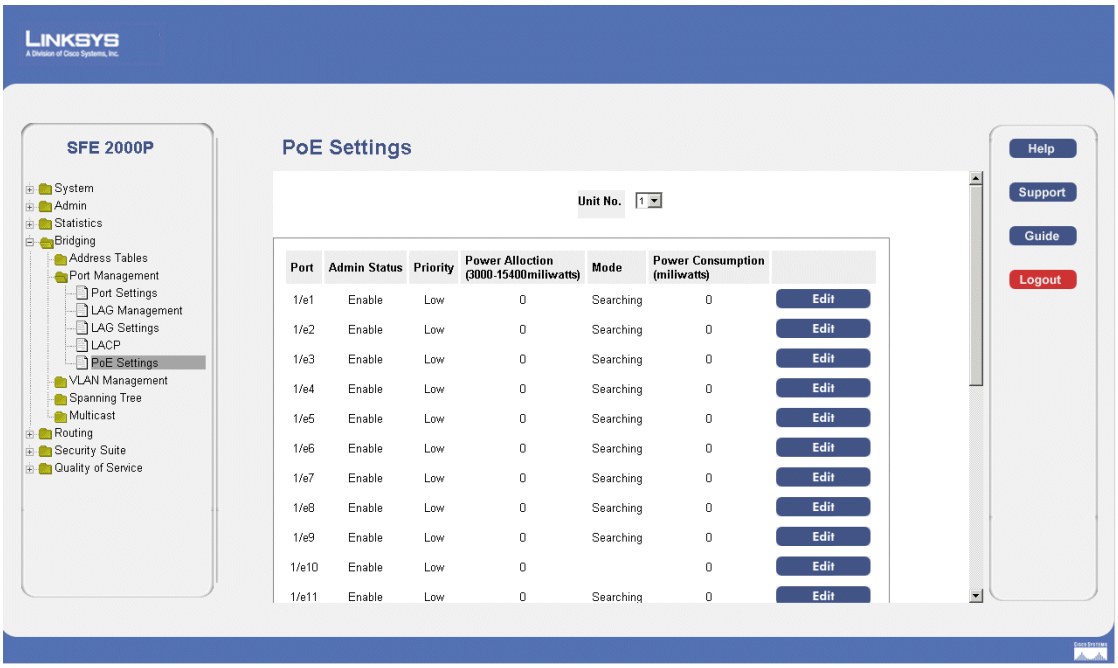
**NOTE:** Due to hardware limitations, the power measurement accuracy is 4%.

# Defining PoE System Information

The *PoE Settings Page* contains system PoE information for enabling PoE on the device, monitoring the current power usage, and enabling PoE traps.

1. Click **Bridging** > **Port Management** > **PoE Settings**. The *PoE Settings Page* opens:

***PoE Settings Page***




The *PoE Settings Page* displays the currently configured PoE ports and contains the following information:

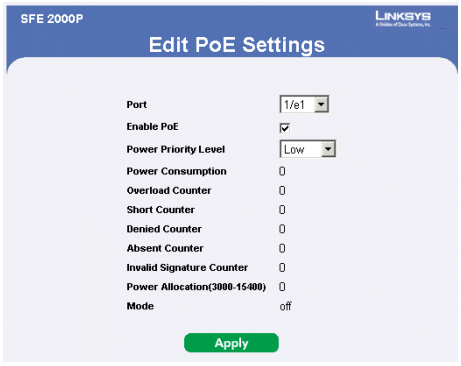
- **Port** — Displays the selected port's number.
- **Admin Status** — Indicates whether PoE is enabled or disabled on the port. The possible values are:
  - *Enable* — Enables PoE on the port. This is the default setting.
  - *Disable* — Disables PoE on the port.
- **Priority** — Indicates the PoE ports' priority. The possible values are: *Critical*, *High* and *Low*. The default is *Low*.
- **Power Allocation (3000-15400 milliwatts)** — Indicates the power allocated to the port. The range is 3000-15400 milliwatts.
- **Mode** — Indicates if the port is enabled to work on PoE. The possible field values are:
  - *On* — Indicates the device is delivering power to the interface.
  - *Off* — Indicates the device is not delivering power to the interface.
  - *Test Fail* — Indicates the powered device test has failed. For example, a port could not be enabled and cannot be used to deliver power to the powered device.
  - *Testing* — Indicates the powered device is being tested. For example, a powered device is tested to confirm it is receiving power from the power supply.

- *Searching* — Indicates that the device is currently searching for a powered device. Searching is the default PoE operational status.
- *Fault* — Indicates that the device has detected a fault on the powered device. For example, the powered device memory could not be read.

- **Power Consumption (milliwatts)** — Indicates the amount of power assigned to the powered device connected to the selected interface. Devices are classified by the powered device, and the classification information used. The field values are represented in Watts. The possible field values are:
  - *0.44 – 12.95* — Indicates that the port is assigned a power consumption level of .44 to 12.95 Watts.
  - *0.44 – 3.8* — Indicates that the port is assigned a power consumption level of .44 to 3.8 Watts.
  - *3.84 – 6.49* — Indicates that the port is assigned a power consumption level of 3.84 to 6.49 Watts.
  - *6.49 – 12.95* — Indicates that the port is assigned a power consumption level of 6.49 to 12.95 Watts.

2. Click the **Edit** button. The *Edit PoE Settings Page* opens:

***Edit PoE Settings Page***




The *Edit PoE Settings Page* contains the following fields:

- **Port** — Indicates the specific interface for which PoE parameters are defined, and assigned to the powered interface connected to the selected port.
- **Enable PoE** — Enables or disables PoE on the port. The possible values are:
  - *Enable* — Enables PoE on the port. This is the default setting.
  - *Disable* — Disables PoE on the port.
- **Power Priority Level** — Determines the port priority if the power supply is low. The port power priority is used if the power supply is low. The field default is low. For example, if the power supply

is running at 99% usage, and port 1 is prioritized as high, but port 3 is prioritized as low, port 1 is prioritized to receive power, and port 3 may be denied power. The possible field values are:

  - *Low* — Defines the PoE priority level as low. This is the default level.
  - *High* — Defines the PoE priority level as high.
  - *Critical* — Defines the PoE priority level as Critical. This is the highest PoE priority level.

- **Power Consumption** — Indicates the amount of power assigned to the powered device connected to the selected interface. Devices are classified by the powered device, and the classification information used. The field values are represented in Watts. The possible field values are:
  - *0.44 – 12.95* — Indicates that the port is assigned a power consumption level of 0.44 to 12.95 Watts.
  - *0.44 – 3.8* — Indicates that the port is assigned a power consumption level of 0.44 to 3.8 Watts.
  - *3.84 – 6.49* — Indicates that the port is assigned a power consumption level of 3.84 to 6.49 Watts.
  - *6.49 – 12.95* — Indicates that the port is assigned a power consumption level of 6.49 to 12.95 Watts.
- **Overload Counter** — Indicates the total power overload occurrences.
- **Short Counter** — Indicates the total power shortage occurrences.
- **Denied Counter** — Indicates times the powered device was denied power.
- **Absent Counter** — Indicates the times the power supply was stopped to the powered device because the powered device was no longer detected.
- **Invalid Signature Counter** — Indicate the times an invalid signature was received. Signatures are the means by which the powered device identifies itself to the PSE. Signature are generated during powered device detection, classification, or maintenance.
- **Power Allocation (milliwatts)** — Indicates the power allocated to the port. The range is 3000-15400 milliwatts.
- **Mode** — Indicates if the port is enabled to work on PoE. The possible field values are:
  - *On* — Indicates the device is delivering power to the interface.
  - *Off* — Indicates the device is not delivering power to the interface.
  - *Test Fail* — Indicates the powered device test has failed. For example, a port could not be enabled and cannot be used to deliver power to the powered device.
  - *Testing* — Indicates the powered device is being tested. For example, a powered device is tested to confirm it is receiving power from the power supply.

- *Searching* — Indicates that the device is currently searching for a powered device. Searching is the default PoE operational status.
- *Fault* — Indicates that the device has detected a fault on the powered device. For example, the powered device memory could not be read.

3. Define the relevant fields.
4. Click **Apply**. The PoE Settings are defined, and the device is updated.

# Configuring Device Security

The Security Suite contains the following sections:

- Passwords Management
- Defining Authentication
- Defining Access Method
- Defining Traffic Control
- Defining 802.1x
- Defining Access Control
- Defining DOS Prevention

# Passwords Management

The Passwords Management section contains the following screens:

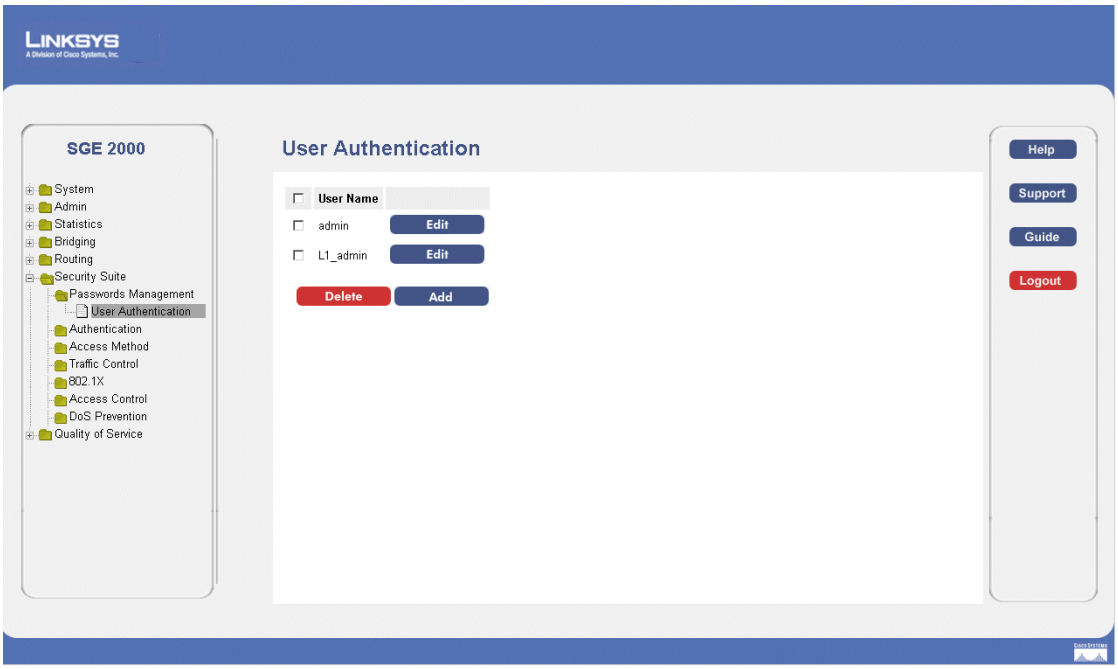
- Defining User Authentication

**Note** By default, a single user name is defined, “admin,” with no password. An additional user name/password is configured for use in the Linksys One system.

## Defining User Authentication

1. Click **Security Suite** > **Passwords Management** > **User Authentication**. The *User Authentication Page Opens:*

***User Authentication Page***

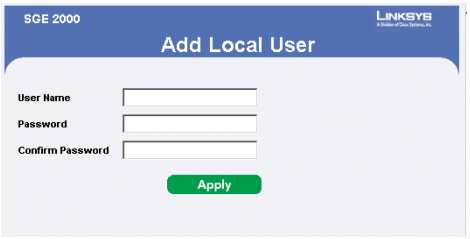



The *User Authentication Page* contains the following fields:

- **User Name** — Displays the user name.

2. Click the **Add** button. The *Add Local User Page* opens:

***Add Local User Page***



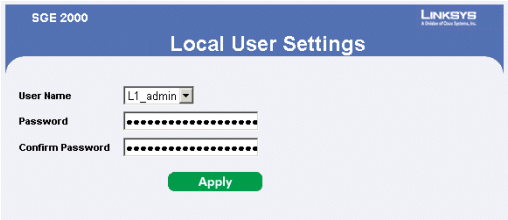

The *Add Local User Page* contains the following fields:

- **User Name** — Displays the user name.
- **Password** — Specifies the new password. The is not displayed. As it entered an "*" corresponding to each character is displayed in the field. (Range: 1-159 characters)
- **Confirm Password** — Confirms the new password. The password entered into this field must be exactly the same as the password entered in the **Password** field.

*Modifying the Local User Settings*

1. Click **Security Suite** > **Passwords Management** > **User Authentication**. The *User Authentication Page Opens:*
2. Click the **Edit** Button. The *Local User Settings Page* opens:

***Local User Settings Page***




The *Local User Settings Page* contains the following fields:

- **User Name** — Displays the user name.
- **Password** — Specifies the new password. The password is not displayed. As it entered an "*" corresponding to each character is displayed in the field. (Range: 1-159 characters)
- **Confirm Password** — Confirms the new password. The password entered into this field must be exactly the same as the password entered in the **Password** field.

3. Define the relevant fields.
4. Click **Apply**. The local user settings are modified, and the device is updated.

# Defining Authentication

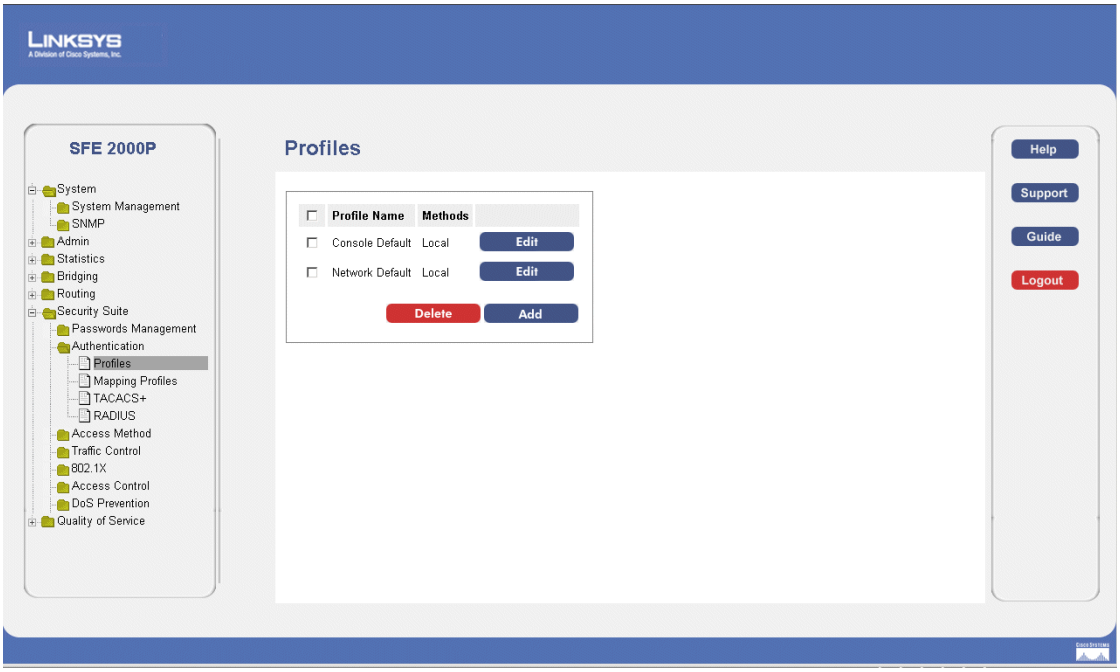
The Authentication section contains the following pages:

- Defining Profiles
- Mapping Profiles
- Defining TACACS+
- Defining RADIUS

## Defining Profiles

1. Click **Security Suite** > **Authentication** > **Profiles**. The *Profiles Page* opens:

***Profiles Page***



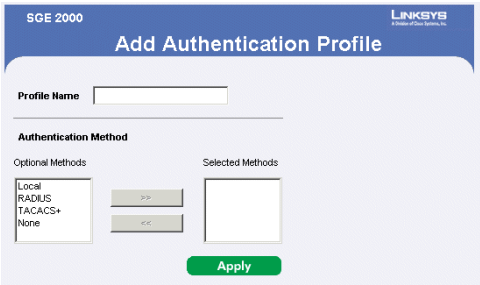

The *Profiles Page* contains the following fields:

- **Profile Name** — Displays the Profile name defined for the Login Table.
- **Methods** — Specifies the authentication method used for port authentication. The possible field values are:
  - *Local* — Authenticates the user at the device level. The device checks the user name and password for authentication.
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - *TACACS+* — Authenticates the user at the TACACS+ server.

– *None* — Indicates that no authentication method is used to authenticate the port.

2. Click the **Add** button. The *Add Authentication Profile Page* opens:

***Add Authentication Profile Page***



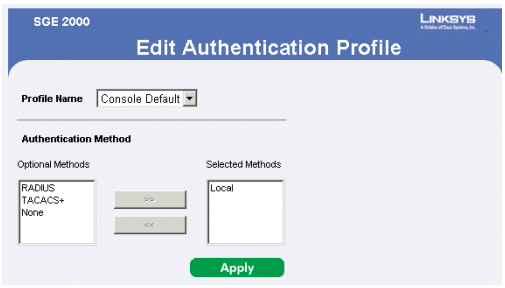

The *Add Authentication Profile Page* contains the following fields:

- **Profile Name** — Displays the Authentication profile name.
- **Authentication Method** — Defines the user authentication methods. The order of the authentication methods indicates the order in which authentication is attempted. For example, if the authentication method order is RADIUS, Local, the system first attempts to authenticate the user on a RADIUS server. If there is no available RADIUS server, then authentication is attempted on the local data base. Note that if the RADIUS server is available, but authentication fails, then the user is denied access. The possible field values are:
  - *Local* — Authenticates the user at the device level. The device checks the user name and password for authentication.
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - *TACACS+* — Authenticates the user at the TACACS+ server.
  - *None* — Indicates that no authentication method is used to authenticate the port.

*Modify the Authentication Profile*

1. Click **Security Suite** > **Authentication** > **Profiles**. The *Profiles Page* opens:
2. Click the **Edit** Button. The *Edit Authentication Profile Page opens:*

***Edit Authentication Profile Page***




The *Edit Authentication Profile Page* contains the following fields:

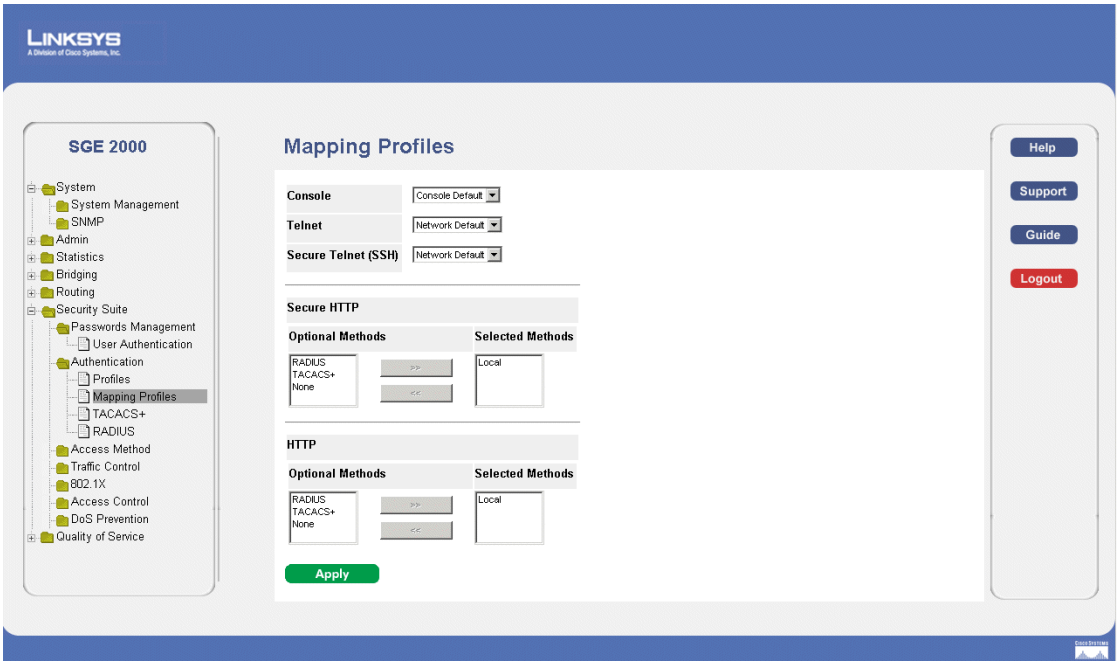
- **Profile Name** — Displays the Authentication profile name.
- **Authentication Methods** — Defines the user authentication methods. The possible field values are:
  - *Local* — Authenticates the user at the device level. The device checks the user name and password for authentication.
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - *TACACS+* — Authenticates the user at the TACACS+ server.

3. Define the relevant fields.
4. Click **Apply**. The authentication profile is defined, and the device is updated.

## Mapping Profiles

1. Click **Security Management** > **Security Suite** > **Authentication**. The *Mapping Profiles Page* opens:

***Mapping Profiles Page***




The *Mapping Profiles Page* contains the following fields:

- **Console** — Indicates that Authentication profiles are used to authenticate console users.
- **Telnet** — Indicates that Authentication profiles are used to authenticate Telnet users
- **Secure Telnet (SSH)** — Indicates that Authentication profiles are used to authenticate Secure Shell (SSH) users. SSH provides clients secure and encrypted remote connections to a device.
- **Secure HTTP** — Configures the device Secure HTTP settings.

*Optional Methods* — Lists available authentication methods.

- *RADIUS* — Remote Authorization Dial-In User Service (RADIUS) servers provide additional security for networks.
- *TACACS+* — Terminal Access Controller Access Control System (TACACS+) provides centralized security user access validation.
- *None* — Indicates that no authentication method is used to authenticate the port.

*Selected Methods* — Selects authentication methods from the methods offered in the Optional methods area.

- **HTTP** — Configures the device HTTP settings.

  *Optional Methods* — Lists available authentication methods.

  - *RADIUS* — Remote Authorization Dial-In User Service (RADIUS) servers provide additional security for networks.
  - *TACACS+* — Terminal Access Controller Access Control System (TACACS+) provides centralized security user access validation.
  - *None* — Indicates that no authentication method is used to authenticate the port.

  *Selected Methods* — Selects authentication methods from the methods offered in the Optional methods area.

  - *None* — Indicates that the authentication method is localized.

2. Define the relevant fields.
3. Click **Apply**. Mapping Profiles is defined, and the device is updated.

## Defining TACACS+

The devices provide Terminal Access Controller Access Control System (TACACS+) client support. TACACS+ provides centralized security for validation of users accessing the device. TACACS+ provides a centralized user management system, while still retaining consistency with RADIUS and other authentication processes. TACACS+ provides the following services:

- **Authentication** — Provides authentication during login and via user names and user-defined passwords.
- **Authorization** — Performed at login. Once the authentication session is completed, an authorization session starts using the authenticated user name. The TACACS server checks the user privileges.

The TACACS+ protocol ensures network integrity through encrypted protocol exchanges between the device and TACACS+ server. To define TACACS+:

1. Click **Security Management** > **Security Suite** > **Authentication**. The *TACACS+ Page* opens:

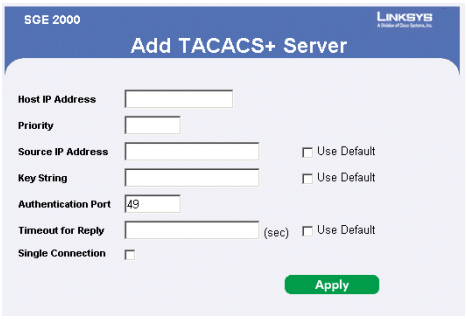
***TACACS+ Page***

The *TACACS+ Page* contains the following fields:

- **Source IP Address** — Displays the device source IP address used for the TACACS+ session between the device and the TACACS+ server.
- **Key String** — Defines the authentication and encryption key for TACACS+ server. The key must match the encryption key used on the TACACS+ server.
- **Timeout for Reply** — Displays the amount of time that passes before the connection between the device and the TACACS+ server times out. The field range is 1-30 seconds.
- **Host IP Address** — Displays the TACACS+ Server IP address.
- **Priority** — Displays the order in which the TACACS+ servers are used. The default is 0.
- **Authentication Port** — Displays the port number through which the TACACS+ session occurs. The default is port 49.
- **Single Connection** — Maintains a single open connection between the device and the TACACS+ server when selected
- **Status** — Displays the connection status between the device and the TACACS+ server. The possible field values are:
  - *Connected* — There is currently a connection between the device and the TACACS+ server.
  - *Not Connected* — There is not currently a connection between the device and the TACACS+ server.

2. Click The **Add** button. The *Add TACACS+ Server Page* opens:

***Add TACACS+ Server Page***




The *Add TACACS+ Server Page* contains the following fields:

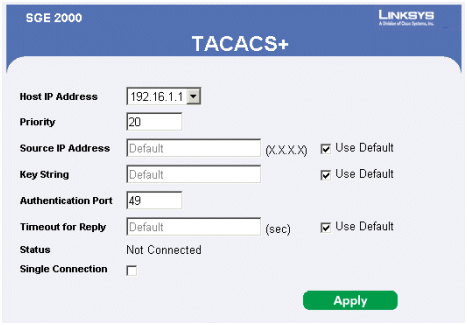
- **Host IP Address** — Displays the TACACS+ Server IP address.
- **Priority** — Displays the order in which the TACACS+ servers are used. The default is 0.
- **Source IP Address** — Displays the device source IP address used for the TACACS+ session between the device and the TACACS+ server.
- **Key String** — Defines the authentication and encryption key for TACACS+ server. The key must match the encryption key used on the TACACS+ server.
- **Authentication Port** — Displays the port number through which the TACACS+ session occurs. The default is port 49.
- **Timeout for Reply** — Displays the amount of time that passes before the connection between the device and the TACACS+ server times out. The field range is 1-30 seconds.
- **Single Connection** — Maintains a single open connection between the device and the TACACS+ server when selected
- **Use Default** — Uses the device default configuration.

3. Add a TACACS+ server.
4. Click **Apply**. The TACACS+ server is added, and the device is updated.

*Modifying TACACS+ Settings*

1. Click **Security Management** > **Security Suite** > **Authentication**. The *TACACS+ Page* opens:
2. Click the **Edit** Button. The *TACACS+ Settings Page* opens:

***TACACS+ Settings Page***




The *TACACS+ Settings Page* contains the following fields:

- **Host IP Address** — Displays the TACACS+ Server IP address.
- **Priority** — Displays the order in which the TACACS+ servers are used. The default is 0.
- **Source IP Address** — Displays the device source IP address used for the TACACS+ session between the device and the TACACS+ server.
- **Key String** — Defines the authentication and encryption key for TACACS+ server. The key must match the encryption key used on the TACACS+ server.
- **Authentication Port** — Displays the port number through which the TACACS+ session occurs. The default is port 49.
- **Timeout for Reply** — Displays the amount of time that passes before the connection between the device and the TACACS+ server times out. The field range is 1-30 seconds.
- **Status** — Displays the connection status between the device and the TACACS+ server. The possible field values are:
  - *Connected* — There is currently a connection between the device and the TACACS+ server.
  - *Not Connected* — There is not currently a connection between the device and the TACACS+ server.
- **Single Connection** — Maintains a single open connection between the device and the TACACS+ server when selected
  - Use Default — Uses the device default configuration.

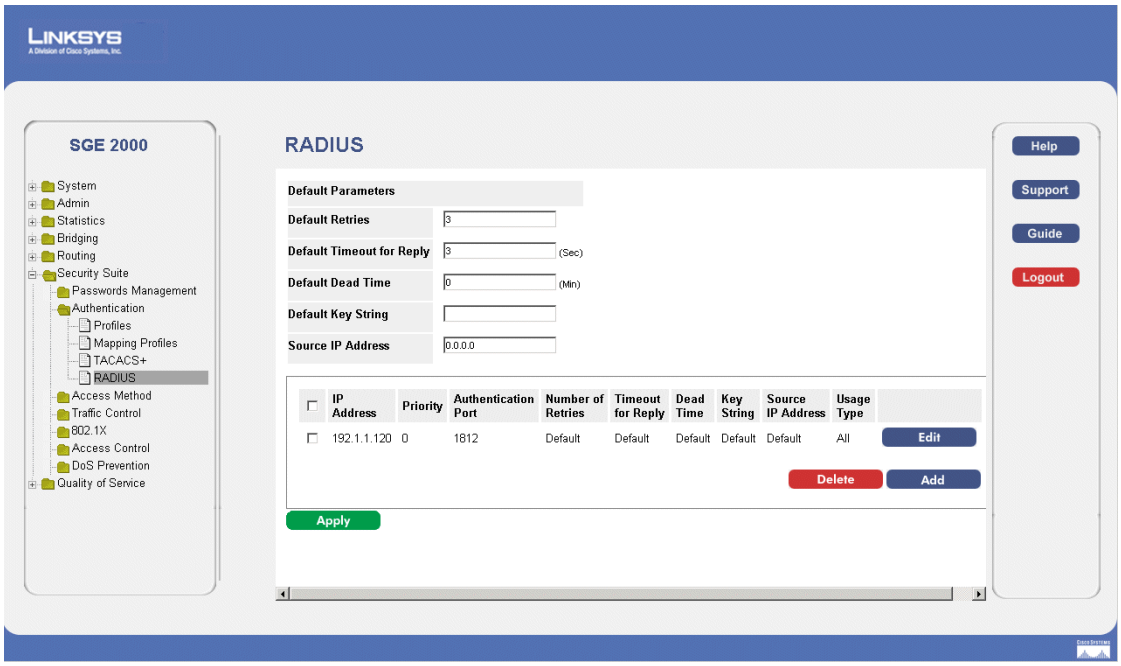
3. Define the relevant fields.
4. Click **Apply**. The TACACS+ settings are modified, and the device is updated.

## Defining RADIUS

Remote Authorization Dial-In User Service (RADIUS) servers provide additional security for networks. RADIUS servers provide a centralized authentication method for web access. The default parameters are user-defined, and are applied to newly defined RADIUS servers. If new default parameters are not defined, the system default values are applied to newly defined RADIUS servers. To define RADIUS:

1. Click **Security Management** > **Security Suite** > **Authentication**. The *RADIUS Page* opens:

***RADIUS Page***



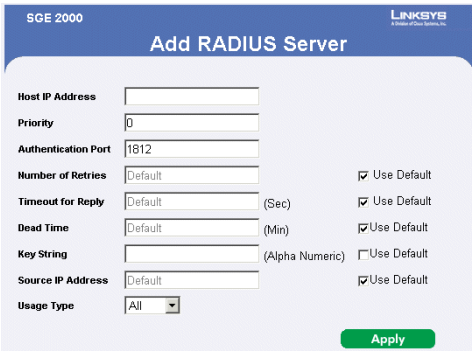

The *RADIUS Page* contains the following fields:

- **Default Retries** — Provides the default retries.
- **Default Timeout for Reply** — Provides the device default Timeout for Reply.
- **Default Dead Time** — Provides the device default Dead Time.
- **Default Key String** — Provides the device default Default Key String.
- **Source IP Address** — Provides the device default Timeout for Reply.
- **IP Address** — The Authentication Server IP addresses.
- **Priority** — The server priority. The possible values are 0-65535, where 1 is the highest value. The RADIUS Server priority is used to configure the server query order.
- **Authentication Port** — Identifies the authentication port. The authentication port is used to verify the RADIUS server authentication. The authenticated port default is 1812.

- **Number of Retries** — Defines the number of transmitted requests sent to RADIUS server before a failure occurs. The possible field values are 1 - 10. Three is the default value.
- **Timeout for Reply** — Defines the amount of the time in seconds the device waits for an answer from the RADIUS server before retrying the query, or switching to the next server. The possible field values are 1 - 30. Three is the default value.
- **Dead Time** — Defines the amount of time (minutes) that a RADIUS server is bypassed for service requests. The range is 0-2000. The Dead Time default is 0 minutes.
- **Key String** — Defines the default key string used for authenticating and encrypting all RADIUS communications between the device and the RADIUS server. This key must match the RADIUS encryption.
- **Source IP Address** — Defines the source IP address that is used for communication with RADIUS servers.
- **Usage Type** — Specifies the RADIUS server authentication type. The default value is Login. The possible field values are:
  - *Login* — Indicates that the RADIUS server is used for authenticating user name and passwords.
  - *802.1X* — Indicates that the RADIUS server is used for 802.1X authentication.
  - *All* — Indicates that the RADIUS server is used for authenticating user name and passwords, and 802.1X port authentication.

2. Click the **Add** button. The *Add Radius Server Page* opens:

***Add Radius Server Page***




The *Add Radius Server Page* contains the following fields:

- **Host IP Address** — Displays the *RADIUS* Server IP address.
- **Priority** — The server priority. The possible values are 0-65535, where 1 is the highest value. The RADIUS Server priority is used to configure the server query order.
- **Authentication Port** — Identifies the authentication port. The authentication port is used to verify the RADIUS server authentication. The authenticated port default is 1812.

- **Number of Retries** — Defines the number of transmitted requests sent to RADIUS server before a failure occurs. The possible field values are 1 - 10. Three is the default value.
- **Timeout for Reply** — Defines the amount of the time in seconds the device waits for an answer from the RADIUS server before retrying the query, or switching to the next server. The possible field values are 1 - 30. Three is the default value.
- **Dead Time** — Defines the amount of time (minutes) that a RADIUS server is bypassed for service requests. The range is 0-2000. The Dead Time default is 0 minutes.
- **Key String** — Defines the default key string used for authenticating and encrypting all RADIUS communications between the device and the RADIUS server. This key must match the RADIUS encryption.
- **Source IP Address** — Defines the source IP address that is used for communication with RADIUS servers.
- **Usage Type** — Specifies the RADIUS server authentication type. The default value is Login. The possible field values are:

  *Login* — Indicates that the RADIUS server is used for authenticating user name and passwords.

  *802.1X* — Indicates that the RADIUS server is used for 802.1X authentication.

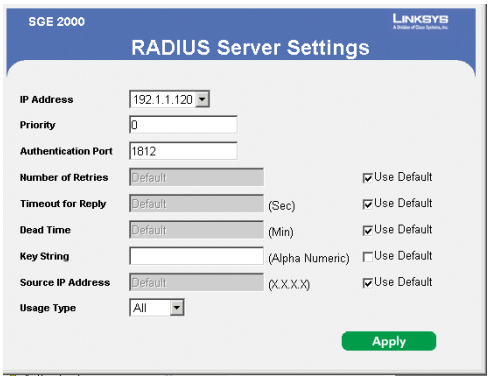
  *All* — Indicates that the RADIUS server is used for authenticating user name and passwords, and 802.1X port authentication.
- **Use Default** — Uses the system default settings.

3. Define the relevant fields.
4. Click **Apply**. The Radius Server is added, and the device is updated.

*Modifying RADIUS Se*rver Settings

1. Click **Security Management** > **Security Suite** > **Authentication**. The *RADIUS Page* opens:
2. Click the **Edit** button. The *Edit RADIUS Settings Page* opens:

***Edit RADIUS Settings Page***




The *Edit RADIUS Settings Page* contains the following fields:

- **IP Address** — Displays the *RADIUS* Server IP address.
- **Priority** — The server priority. The possible values are 0-65535, where 1 is the highest value. The RADIUS Server priority is used to configure the server query order.
- **Authentication Port** — Identifies the authentication port. The authentication port is used to verify the RADIUS server authentication. The authenticated port default is 1812.
- **Number of Retries** — Defines the number of transmitted requests sent to RADIUS server before a failure occurs. The possible field values are 1 - 10. Three is the default value.
- **Timeout for Reply** — Defines the amount of the time in seconds the device waits for an answer from the RADIUS server before retrying the query, or switching to the next server. The possible field values are 1 - 30. Three is the default value.
- **Dead Time** — Defines the amount of time (minutes) that a RADIUS server is bypassed for service requests. The range is 0-2000. The Dead Time default is 0 minutes.
- **Key String** — Defines the default key string used for authenticating and encrypting all RADIUS communications between the device and the RADIUS server. This key must match the RADIUS encryption.
- **Source IP Address** — Defines the source IP address that is used for communication with RADIUS servers.
- **Usage Type** — Specifies the RADIUS server authentication type. The default value is Login. The possible field values are:
  - *Login* — Indicates that the RADIUS server is used for authenticating user name and passwords.
  - *802.1X* — Indicates that the RADIUS server is used for 802.1X authentication.
  - *All* — Indicates that the RADIUS server is used for authenticating user name and passwords, and 802.1X port authentication.
- **Use Default** — Uses the system default settings.

# Defining Access Method

The access method section contains the following pages:

- Defining Access Profiles
- Defining Profile Rules

## Defining Access Profiles

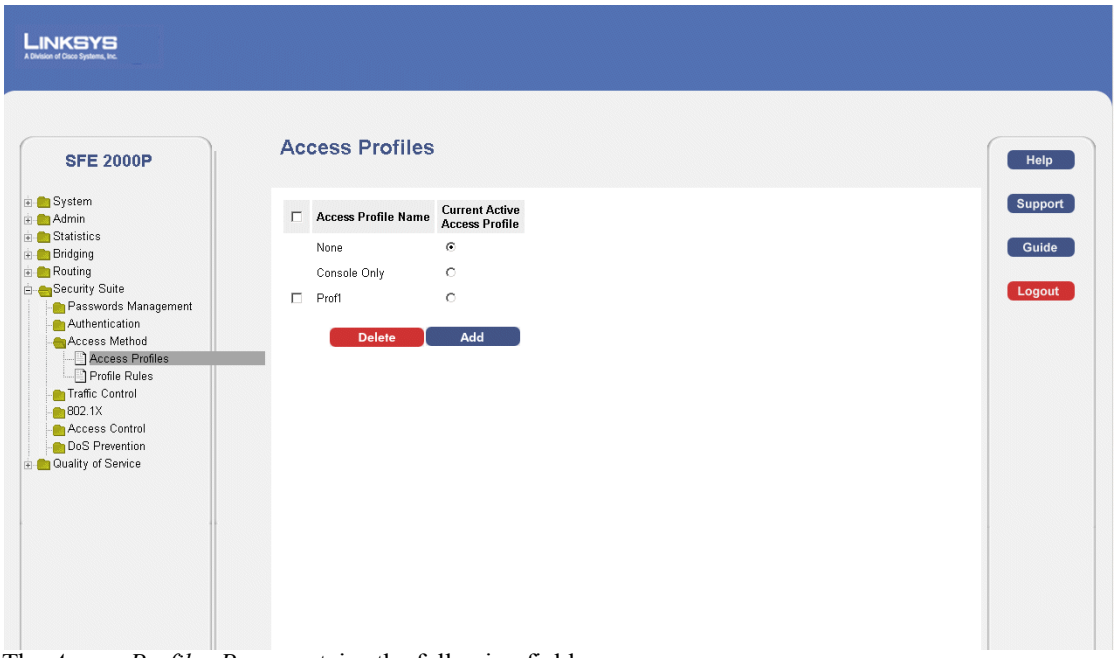
Access profiles are profiles and rules for accessing the device. Access to management functions can be limited to user groups. User groups are defined for interfaces according to IP addresses or IP subnets. Access profiles contain management methods for accessing and managing the device. The device management methods include:

- All
- Telnet
- Secure Telnet (SSH)
- HTTP

Management access to different management methods may differ between user groups. For example, User Group 1 can access the switch module only via an HTTPS session, while User Group 2 can access the switch module via both HTTPS and Telnet sessions. The Access Profile Page contains the currently configured access profiles and their activity status. Assigning an access profile to an interface denies access via other interfaces. If an access profile is assigned to any interface, the device can be accessed by all interfaces. To define access profiles:

1. Click **Security Suite** > **Access Method** > **Access Profiles**. The *Access Profiles Page* opens:

***Access Profiles Page***

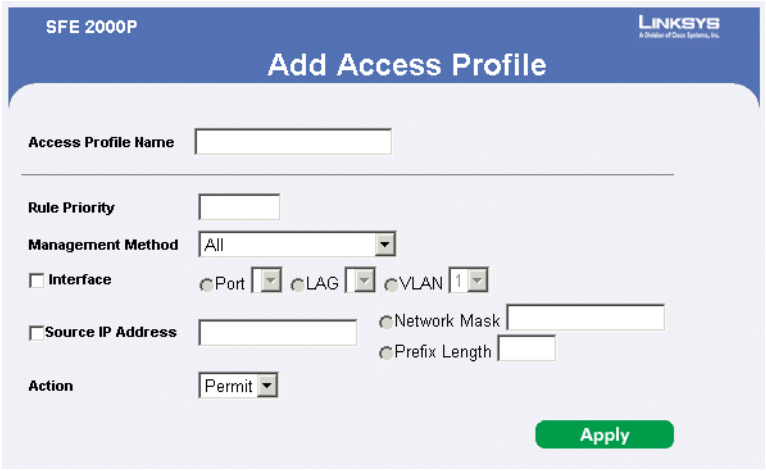



The *Access Profiles Page* contains the following fields:

- **Access Profile Name** — Defines the access profile name. The access profile name can contain up to 32 characters.
- **Current Active Access Profile** — Defines the access profile currently active.
- **Remove** — Removes the selected access profile. The possible field values are:
  - *Checked* — Removes the selected access profile.
  - *Unchecked* — Maintains the access profiles.

2. Click the **Add** button. The *Add Access Profile Page* opens:

*Add Access Profile Page*




The *Add Access Profile Page* contains the following fields:

- **Access Profile Name** — Defines the access profile name. The access profile name can contain up to 32 characters.
- **Rule Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis. The rule priorities are assigned in the Profile Rules Page.
- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.
  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.
- **Interface** — Defines the interface on which the access profile is defined. The possible field values are:

  - *Port* — Specifies the port on which the access profile is defined.
  - *LAG* — Specifies the LAG on which the access profile is defined.
  - *VLAN* — Specifies the VLAN on which the access profile is defined.

- **Source IP Address** — Defines the interface source IP address to which the access profile applies. The Source IP Address field is valid for a subnetwork.
- **Network Mask** — Determines what subnet the source IP Address belongs to in the network.
- **Prefix Length** — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.

3. Define the relevant fields.
4. Click **Apply**. The access profile is added, and the device is updated.

## Defining Profile Rules

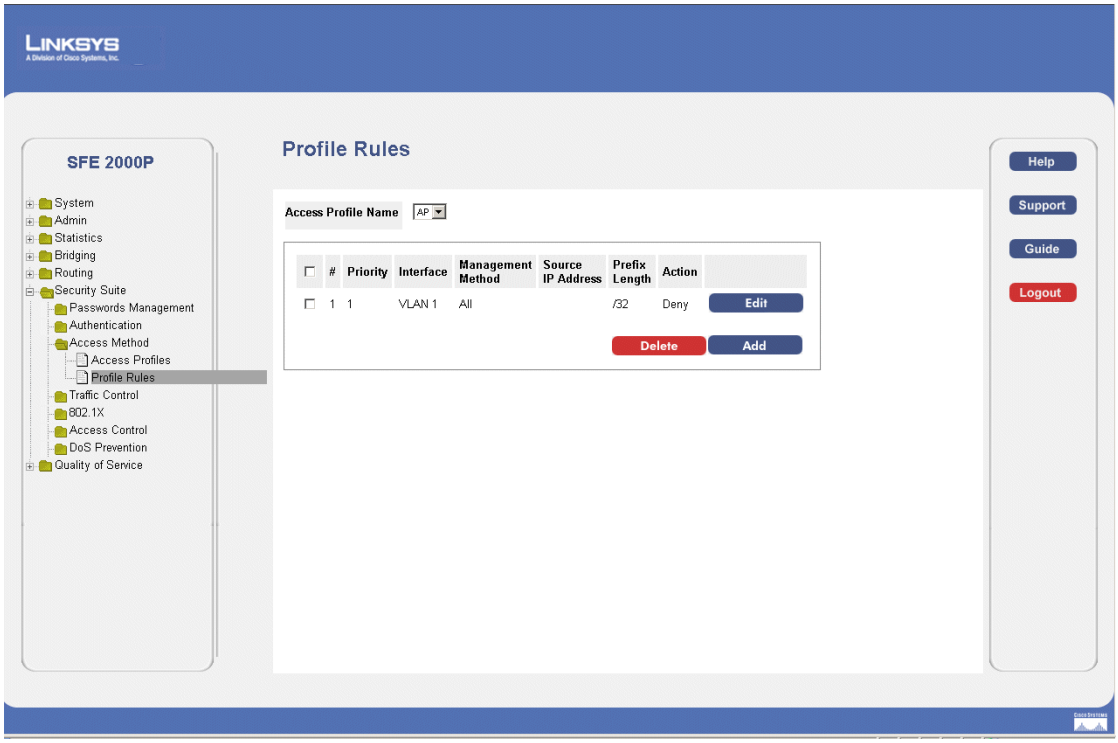
Access profiles can contain up to 128 rules that determine which users can manage the switch module, and by which methods. Users can also be blocked from accessing the device. Rules are composed of filters including:

- Rule Priority
- Interface
- Management Method
- IP Address
- Prefix Length
- Forwarding Action

To define profile rules:

1. Click **Security Suite** > **Access Method** > **Profile Rules**. The *Profile Rules Page* opens:

***Profile Rules Page***




The *Profile Rules Page* contains the following fields:

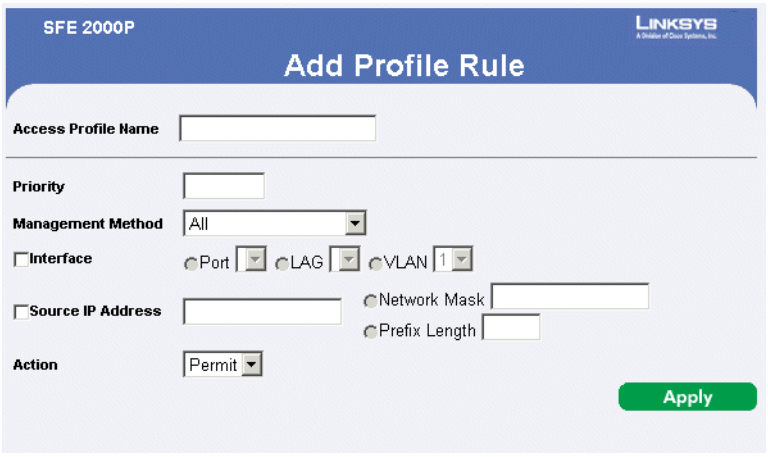
- **Access Profile Name** — Displays the access profile to which the rule is attached.
- **Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis.
- **Interface** — Indicates the interface type to which the rule applies. The possible field values are:
  - *Port* — Attaches the rule to the selected port.
  - *LAG* — Attaches the rule to the selected LAG.
  - *VLAN* — Attaches the rule to the selected VLAN.
- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.

  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.
  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.

- **Source IP Address** — Defines the interface source IP address to which the rule applies.
- **Prefix Length** — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.
- **Remove** — Removes rules from the selected access profiles. The possible field values are:
  - *Checked* — Removes the selected rule from the access profile.
  - *Unchecked* — Maintains the rules attached to the access profile.

2. Click the **Add** button. The *Add Profile Rule Page* opens:

***Add Profile Rule Page***




The *Add Profile Rule Page* contains the following fields:

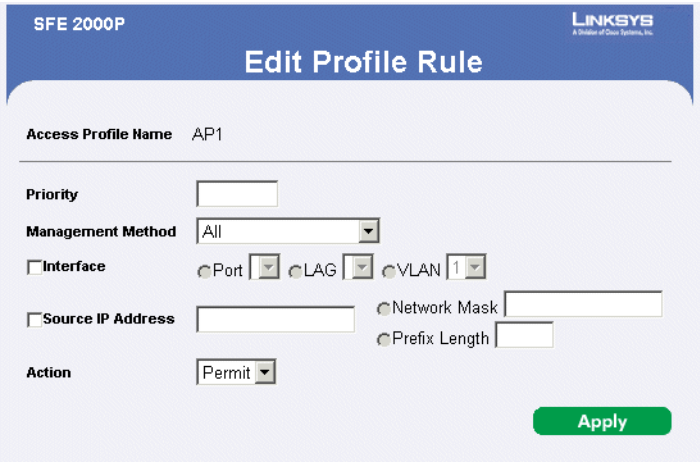
- **Access Profile Name** — Defines the access profile name. The access profile name can contain up to 32 characters.

- **Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis. The rule priorities are assigned in the Profile Rules Page.
- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.
  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.
- **Interface** — Defines the interface on which the access profile is defined. The possible field values are:
  - *Port* — Specifies the port on which the access profile is defined.
  - *LAG* — Specifies the LAG on which the access profile is defined.
  - *VLAN* — Specifies the VLAN on which the access profile is defined.
- **Source IP Address** — Defines the interface source IP address to which the access profile applies. The Source IP Address field is valid for a subnetwork.
- **Network Mask** — Determines what subnet the source IP Address belongs to in the network.
- **Prefix Length** — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.

*Modifying Profile Rules*

1. Click **Security Suite** > **Access Method** > **Profile Rules**. The *Profile Rules Page* opens:
2. Click the **Edit** button. The *Edit Profile Rule Page* opens:

***Edit Profile Rule Page***




The *Edit Profile Rule Page* contains the following fields:

- **Access Profile Name** — Defines the access profile name. The access profile name can contain up to 32 characters.
- **Priority** — Defines the rule priority. When the packet is matched to a rule, user groups are either granted permission or denied device management access. The rule number is essential to matching packets to rules, as packets are matched on a first-fit basis. The rule priorities are assigned in the Profile Rules Page.
- **Management Method** — Defines the management method for which the rule is defined. Users with this access profile can access the device using the management method selected. The possible field values are:
  - *All* — Assigns all management methods to the rule.
  - *Telnet* — Assigns Telnet access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *Secure Telnet (SSH)* — Assigns SSH access to the rule. If selected, users accessing the device using Telnet meeting access profile criteria are permitted or denied access to the device.
  - *HTTP* — Assigns HTTP access to the rule. If selected, users accessing the device using HTTP meeting access profile criteria are permitted or denied access to the device.
  - *Secure HTTP (HTTPS)* — Assigns HTTPS access to the rule. If selected, users accessing the device using HTTPS meeting access profile criteria are permitted or denied access to the device.

  - *SNMP* — Assigns SNMP access to the rule. If selected, users accessing the device using SNMP meeting access profile criteria are permitted or denied access to the device.

- **Interface** — Defines the interface on which the access profile is defined. The possible field values are:
  - *Port* — Specifies the port on which the access profile is defined.
  - *LAG* — Specifies the LAG on which the access profile is defined.
  - *VLAN* — Specifies the VLAN on which the access profile is defined.
- **Source IP Address** — Defines the interface source IP address to which the access profile applies. The Source IP Address field is valid for a subnetwork.
- **Network Mask** — Determines what subnet the source IP Address belongs to in the network.
- **Prefix Length** — Defines the number of bits that comprise the source IP address prefix, or the network mask of the source IP address.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Permit* — Permits access to the device.
  - *Deny* — Denies access to the device. This is the default.

3. Define the relevant fields.
4. Click **Apply**. The profile rules are defined, and the device is updated.

# Defining Traffic Control

The Traffic Control section contains the following pages:

- Defining Storm Control
- Defining Port Security

## Defining Storm Control

Storm Control enables limiting the amount of Multicast and Broadcast frames accepted and forwarded by the device. When Layer 2 frames are forwarded, Broadcast and Multicast frames are flooded to all ports on the relevant VLAN. This occupies bandwidth, and loads all nodes connected on all ports.

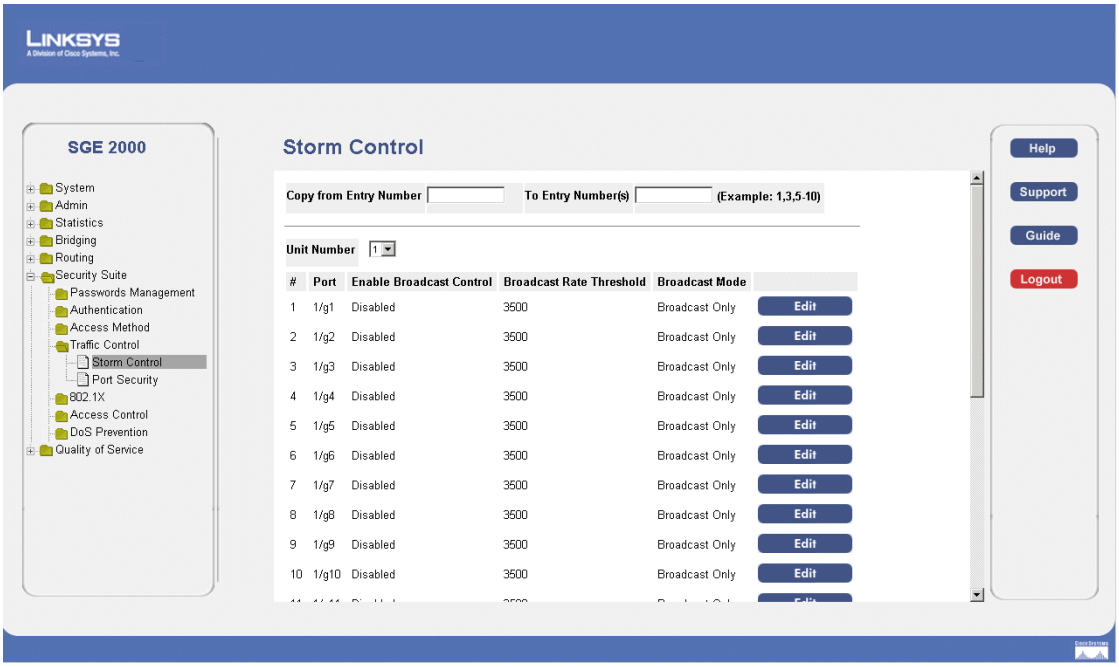
A Broadcast Storm is a result of an excessive amount of broadcast messages simultaneously transmitted across a network by a single port. Forwarded message responses are heaped onto the network, straining network resources or causing the network to time out.

Storm Control is enabled per all ports by defining the packet type and the rate the packets are transmitted. The system measures the incoming Broadcast and Multicast frame rates separately on each port and discards the frames when the rate exceeds a user-defined rate.

*The Storm Control Page* provides fields for configuring Broadcast Storm Control. To define storm control:

1. Click **Security Suite** > **Traffic Control** > **Storm Control**. The *Storm Control Page* opens:

***Storm Control Page***




The *Storm Control Page* contains the following fields:

- **Copy From Entry Number** — Indicates the row number from which storm control parameters are copied.
- **To Entry Number(s)** — Indicates the row number to which storm control parameters are copied.
- **Unit Number** — Displays the stacking member for which the storm control parameters are displayed.
- **Port** — Indicates the port from which storm control is enabled.
- **Enable Broadcast Control** — Indicates if Broadcast packet types are forwarded on the specific interface. The possible field values are:
  - *Enable* — Enables Broadcast packet types to be forwarded.
  - *Disable* — Disables Broadcast packet types to be forwarded.
- **Broadcast Rate Threshold** — The maximum rate (packets per second) at which unknown packets are forwarded. The rate is 3,500 - 1,000,000 kb/sec.
- **Broadcast Mode** — Specifies the Broadcast mode currently enabled on the device. The possible field values are:
  - *Multicast & Broadcast* — Counts Broadcast and Multicast traffic together.
  - *Broadcast Only* — Counts only Broadcast traffic.

2. Define the relevant fields.
3. Click **Apply**. Storm control is enabled, and the device is updated.

*Modifying Storm Control*

1. Click **Security Suite** > **Traffic Control** > **Storm Control**. The *Storm Control Page* opens:
2. Click the **Edit** Button. The *Edit Storm Control Page* opens:

***Edit Storm Control Page***

The *Edit Storm Control Page* contains the following fields:

- **Port** — Indicates the port from which storm control is enabled.
- **Enable Broadcast Control** — Indicates if Broadcast packet types are forwarded on the specific interface. The possible field values are:

- **Broadcast Mode** — Specifies the Broadcast mode currently enabled on the device. The possible field values are:
  - *Multicast & Broadcast* — Counts Broadcast and Multicast traffic together.
  - *Broadcast Only* — Counts only Broadcast traffic.
- **Broadcast Rate Threshold** — The maximum rate (packets per second) at which unknown packets are forwarded. The rate is 3,500 - 1,000,000 kb/sec.

3. Modify the relevant fields.
4. Click **Apply**. Storm control is modified, and the device is updated.

## Defining Port Security

Network security can be increased by limiting access on a specific port only to users with specific MAC addresses. The MAC addresses can be dynamically learned or statically configured. Locked port security monitors both received and learned packets that are received on specific ports. Access to the locked port is limited to users with specific MAC addresses. These addresses are either manually defined on the port, or learned on that port up to the point when it is locked. When a packet is received on a locked port, and the packet source MAC address is not tied to that port (either it was learned on a different port, or it is unknown to the system), the protection mechanism is invoked, and can provide various options. Unauthorized packets arriving at a locked port are either:

- Forwarded
- Discarded with no trap
- Discarded with a trap
- Cause the port to be shut down.

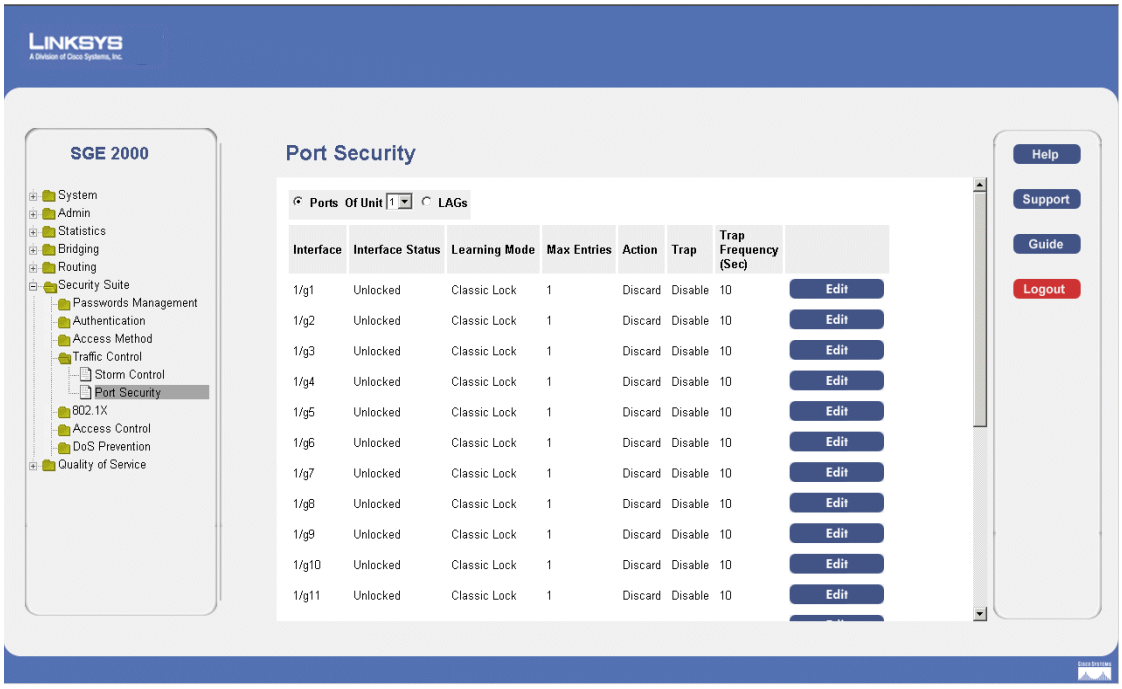
Locked port security also enables storing a list of MAC addresses in the configuration file. The MAC address list can be restored after the device has been reset. Disabled ports are activated from the Port Security Page.

**Note** To configure port lock, 802.1x multiple host mode must be enabled.

To define port security:

1. Click **Security Suite** > **Traffic Control** > **Port Security**. The *Port Security Page* opens:

***Port Security Page***




The *Port Security Page* contains the following fields:

- **Ports** — Indicates the port number on which port security is configured.
- **LAGs** — Indicates the LAG number on which port security is configured.
- **Of Unit** — Displays the stacking member for which the port security parameters are displayed.
- **Interface** — Displays the port or LAG name.
- **Interface Status** — Indicates the port security status. The possible field values are:
  - *Unlocked* — Indicates the port is currently unlocked. This is the default value.
  - *Locked* — Indicates the port is currently locked.
- **Learning Mode** — Defines the locked port type. The Learning Mode field is enabled only if Locked is selected in the Interface Status field.The possible field values are:
  - *Classic Lock* — Locks the port using the classic lock mechanism. The port is immediately locked, regardless of the number of addresses that have already been learned.
  - *Limited Dynamic Lock* — Locks the port by deleting the current dynamic MAC addresses associated with the port. The port learns up to the maximum addresses allowed on the port. Both relearning and aging MAC addresses are enabled.

In order to change the Learning Mode, the Lock Interface must be set to Unlocked. Once the mode is changed, the Lock Interface can be reinstated.

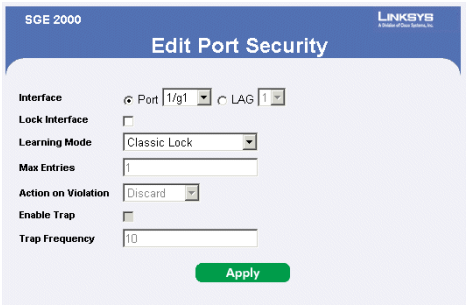
- **Max Entries** — Specifies the number of MAC addresses that can be learned on the port. The Max Entries field is enabled only if Locked is selected in the Interface Status field. In addition, the Limited Dynamic Lock mode is selected. The default is 1.
- **Action** — Indicates the action to be applied to packets arriving on a locked port. The possible field values are:
  - *Forward* — Forwards packets from an unknown source without learning the MAC address.
  - *Discard* — Discards packets from any unlearned source. This is the default value.
  - *Shutdown* — Discards packets from any unlearned source and shuts down the port. The port remains shut down until reactivated, or until the device is reset.
- **Trap** — Enables traps when a packet is received on a locked port. The possible field values are:
  - *Enable* — Enables traps.
  - *Disable* — Disables traps.
- **Trap Frequency (Sec)** — The amount of time (in seconds) between traps. The default value is 10 seconds.

2. Define the relevant fields.
3. Click **Apply**. Port security is defined, and the device is updated.

*Modifying Port Security*

1. Click **Security Suite** > **Traffic Control** > **Port Security**. The *Port Security Page* opens:
2. Click the **Edit** Button. The *Edit Port Security Page* opens:

***Edit Port Security Page***




The *Edit Port Security Page* contains the following fields:

- **Interface** — Displays the port or LAG name.
- **Lock Interface** — Indicates the port security status. The possible field values are:

  - *Unchecked* — Indicates the port is currently unlocked. This is the default value.
  - *Checked* — Indicates the port is currently locked.

- **Learning Mode** — Defines the locked port type. The Learning Mode field is enabled only if Locked is selected in the Interface Status field.The possible field values are:
  - *Classic Lock* — Locks the port using the classic lock mechanism. The port is immediately locked, regardless of the number of addresses that have already been learned.
  - *Limited Dynamic Lock* — Locks the port by deleting the current dynamic MAC addresses associated with the port. The port learns up to the maximum addresses allowed on the port. Both relearning and aging MAC addresses are enabled.

  In order to change the Learning Mode, the Lock Interface must be set to Unlocked. Once the mode is changed, the Lock Interface can be reinstated.

- **Max Entries** — Specifies the number of MAC addresses that can be learned on the port. The Max Entries field is enabled only if Locked is selected in the Interface Status field. In addition, the Limited Dynamic Lock mode is selected. The default is 1.

- **Action on Violation** — Indicates the action to be applied to packets arriving on a locked port. The possible field values are:
  - *Forward* — Forwards packets from an unknown source without learning the MAC address.
  - *Discard* — Discards packets from any unlearned source. This is the default value.
  - *Shutdown* — Discards packets from any unlearned source and shuts down the port. The port remains shut down until reactivated, or until the device is reset.

- **Enable Trap** — Enables traps when a packet is received on a locked port. The possible field values are:
  - *Enable* — Enables traps.
  - *Disable* — Disables traps.

- **Trap Frequency** — The amount of time (in seconds) between traps. The default value is 10 seconds.

3. Modify the relevant fields.
4. Click **Apply**. Port security is modified, and the device is updated.

# Defining 802.1x

Port based authentication enables authenticating system users on a per-port basis via a external server. Only authenticated and approved system users can transmit and receive data. Ports are authenticated via the RADIUS server using the Extensible Authentication Protocol (EAP). Port Authentication includes:

- **Authenticators** — Specifies the port, which is authenticated before permitting system access.
- **Supplicants** — Specifies host connected to the authenticated port requesting to access the system services.
- **Authentication Server** — Specifies the external server, for example, the RADIUS server that performs the authentication on behalf of the authenticator, and indicates whether the supplicant is authorized to access system services.

Port based authentication creates two access states:

- **Controlled Access** — Permits communication between the supplicant and the system, if the supplicant is authorized.
- **Uncontrolled Access** — Permits uncontrolled communication regardless of the port state.

The *802.1x* page configures port to use Extensible Authentication Protocol (EAP).

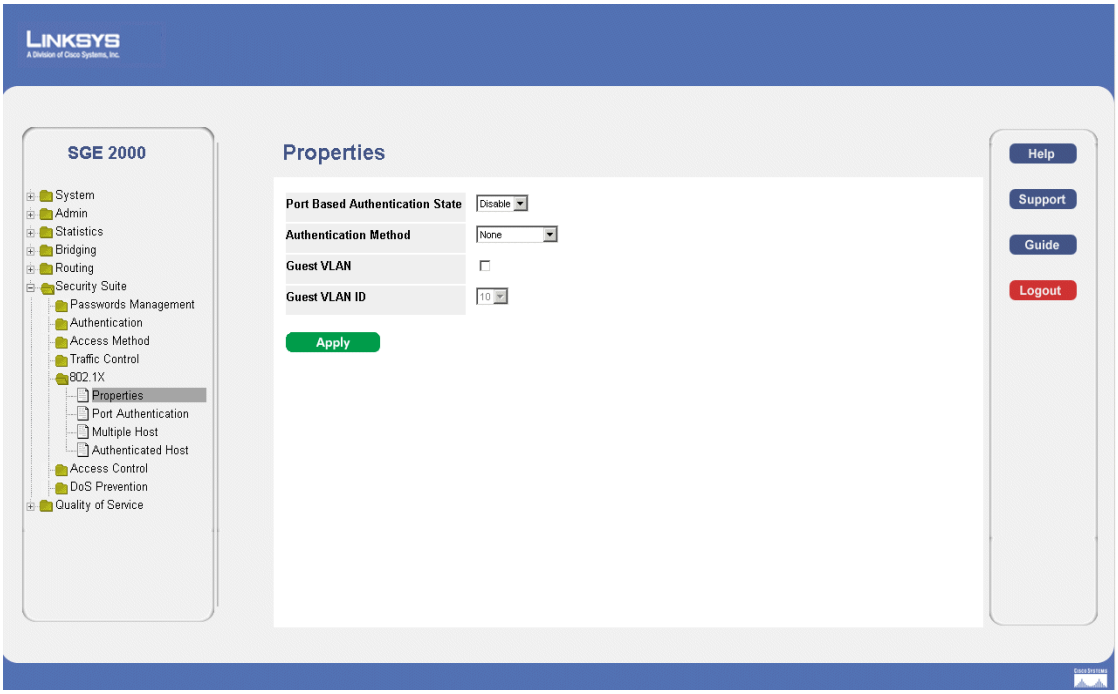
The 802.1x section contains the following pages:

- Defining 802.1X Properties
- Defining Port Authentication
- Defining Multiple Hosts
- Defining Authenticated Host

## Defining 802.1X Properties

1. Click **Security Suite** > **802.1X** > **Properties**. The *802.1X Properties Page* opens:

***802.1X Properties Page***




The *802.1X Properties Page* contains the following fields:

- **Port Based Authentication State** — Indicates if Port Authentication is enabled on the device. The possible field values are:
  - *Enable* — Enables port-based authentication on the device.
  - *Disable* — Disables port-based authentication on the device.
- **Authentication Method** — Defines the user authentication methods. The possible field values are:
  - *RADIUS* — Authenticates the user at the RADIUS server.
  - *RADIUS, none* — Authenticates the user at the RADIUS server if one is available, otherwise it assigns no authentication method.
  - *None* — Assigns no authentication method to the authentication profile.
- **Guest VLAN** — Specifies whether the Guest VLAN is enabled on the device. The possible field values are:
  - *Enable* — Enables using a Guest VLAN for unauthorized ports. If a Guest VLAN is enabled, the unauthorized port automatically joins the VLAN selected in the *VLAN List* field.

– *Disable* — Disables port-based authentication on the device. This is the default.

- **Guest VLAN ID** — Displays the Guest VLAN ID.

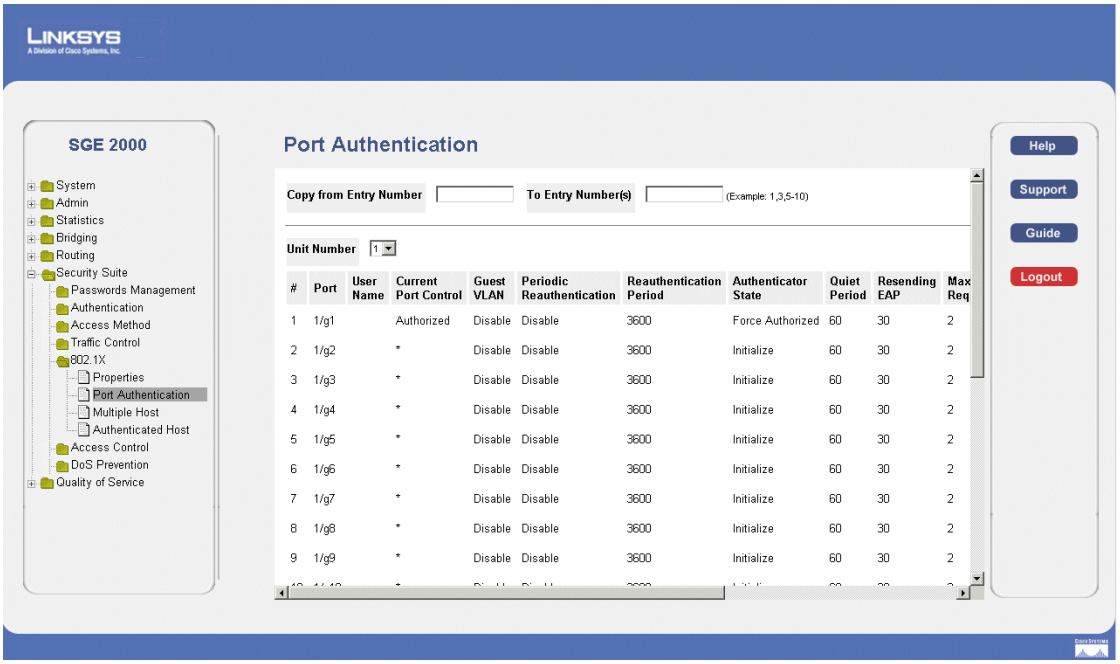
2. Define the relevant fields.

3. Click **Apply**. The 802.1X properties are defined, and the device is updated.

## Defining Port Authentication

1. Click **Security Suite** > **802.1X** > **Port Authentication**. The *802.1X Properties Page* opens:

**802.1X *Port Authentication Page***




The *802.1X Port Authentication Page* contains the following fields:

- **Copy From Entry Number** — Indicates the row number from which port authentication parameters are copied.
- **To Entry Number(s)** — Indicates the row number to which port authentication parameters are copied.
- **Unit Number** — Displays the stacking member for which the port authentication parameters are displayed.
- **Port** — Indicates the port name.
- **User Name** — Displays the user name.
- **Current Port Control** — Displays the admin port authorization state.
- **Guest VLAN** — Displays the Guest VLAN.

- **Periodic Reauthentication** — Permits immediate port reauthentication.
- **Reauthentication Period** — Specifies the number of seconds in which the selected port is reauthenticated (Range: 300-4294967295). The field default is 3600 seconds.
- **Authenticator State** — Specifies the port authorization state. The possible field values are as follows:
  - *Force-Authorized* — The controlled port state is set to Force-Authorized (forward traffic).
  - *Force-Unauthorized* — The controlled port state is set to Force-Unauthorized (discard traffic).
- **Quiet Period** — Specifies the number of seconds that the switch remains in the quiet state following a failed authentication exchange (Range: 0-65535).
- **Resending EAP** — Specifies the number of seconds that the switch waits for a response to an EAP - request/identity frame, from the supplicant (client), before resending the request.
- **Max EAP Requests** — The total amount of EAP requests sent. If a response is not received after the defined period, the authentication process is restarted. The field default is 2 retries.
- **Supplicant Timeout** — Displays the number of seconds that lapses before EAP requests are resent to the supplicant (Range: 1-65535). The field default is 30 seconds.
- **Server Timeout** — Specifies the number of seconds that lapses before the switch resends a request to the authentication server (Range: 1-65535). The field default is 30 seconds.
- **Termination Cause** — Indicates the reason for which the port authentication was terminated.

*Modifying 8021X Security*

1. Click **Security Suite** > **802.1X** > **Properties**. The *802.1X Properties Page* opens:
2. Click the **Edit** button. The *Port Authentication Settings Page* opens:

***Port Authentication Settings Page***

The *Port Authentication Settings Page* contains the following fields:

- **Port** — Indicates the port name.
- **User Name** — Displays the user name.
- **Current Port Control** — Displays the current port authorization state.
- **Admin Port Control** — Displays the admin port authorization state.
- **Enable Guest VLAN** — Specifies whether the Guest VLAN is enabled on the device. The possible field values are:
  - *Enable* — Enables using a Guest VLAN for unauthorized ports. If a Guest VLAN is enabled, the unauthorized port automatically joins the VLAN selected in the *VLAN List* field.
  - *Disable* — Disables port-based authentication on the device. This is the default.
- **Enable Periodic Reauthentication** — Permits immediate port reauthentication.
- **Reauthentication Period** — Specifies the number of seconds in which the selected port is reauthenticated (Range: 300-4294967295). The field default is 3600 seconds.
- **Reauthenticate Now** — Specifies that authentication is applied on the device when the **Apply** button is pressed.
- **Authenticator State** — Specifies the port authorization state. The possible field values are as follows:
  - *Force-Authorized* — The controlled port state is set to Force-Authorized (forward traffic).
  - *Force-Unauthorized* — The controlled port state is set to Force-Unauthorized (discard traffic).

- **Quiet Period** — Specifies the number of seconds that the switch remains in the quiet state following a failed authentication exchange (Range: 0-65535).
- **Resending EAP** — Specifies the number of seconds that the switch waits for a response to an EAP - request/identity frame, from the supplicant (client), before resending the request.
- **Max EAP Requests** — The total amount of EAP requests sent. If a response is not received after the defined period, the authentication process is restarted. The field default is 2 retries.
- **Supplicant Timeout** — Displays the number of seconds that lapses before EAP requests are resent to the supplicant (Range: 1-65535). The field default is 30 seconds.
- **Server Timeout** — Specifies the number of seconds that lapses before the switch resends a request to the authentication server (Range: 1-65535). The field default is 30 seconds.
- **Termination Cause** — Indicates the reason for which the port authentication was terminated.

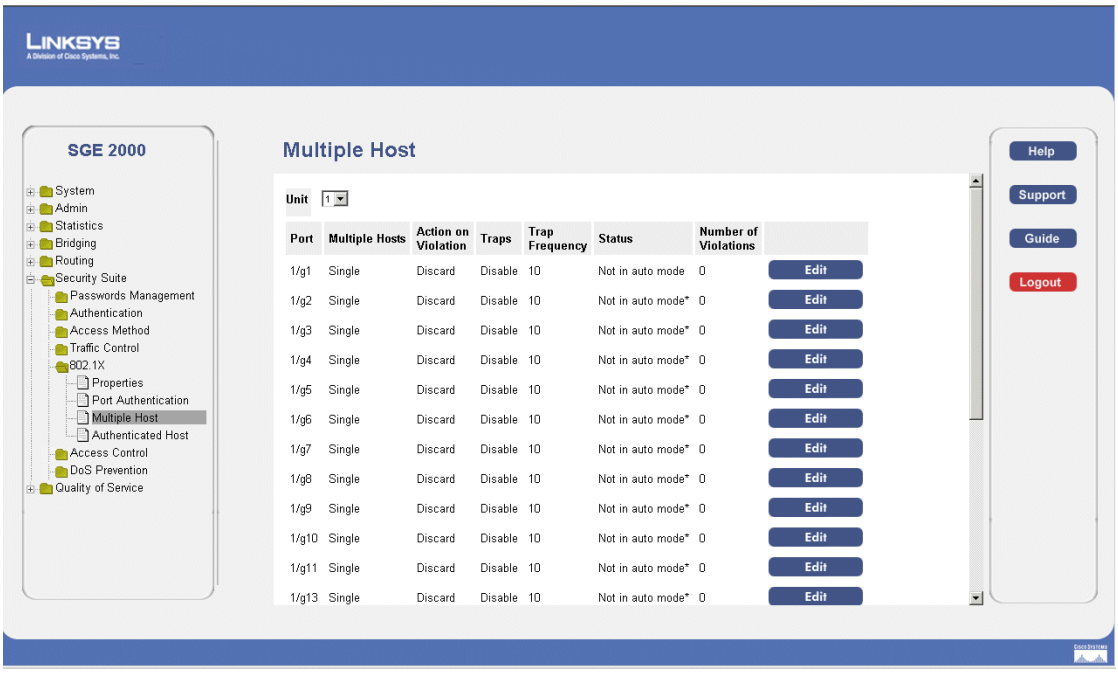
3. Modify the relevant fields.
4. Click **Apply**. The port authentication settings are defined, and the device is updated.

## Defining Multiple Hosts

The *802.1X Multiple Host Page* page allows network managers to configure advanced port-based authentication settings for specific ports and VLANs.

1. Click **Security Suite** > **802.1X** > **Multiple Host**. The *802.1X Multiple Host Page* opens:

***802.1X Multiple Host Page***



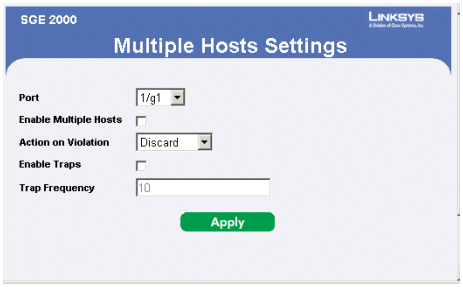

The *802.1X Multiple Host Page* contains the following fields:

- **Unit Number** — Displays the stacking member for which the Multiple Hosts parameters are displayed.
- **Port** — Displays the port number for which advanced port-based authentication is enabled.
- **Multiple Hosts** — Indicates whether multiple hosts are enabled. Multiple hosts must be enabled in order to either disable the ingress-filter, or to use port-lock security on the selected port. The possible field values are:
- **Action on Violation** — Defines the action to be applied to packets arriving in single-host mode, from a host whose MAC address is not the supplicant MAC address. The possible field values are:
  - *Forward* — Forwards the packet.
  - *Discard* — Discards the packets. This is the default value.
  - *DiscardDisable* — Discards the packets and shuts down the port. The ports remains shut down until reactivated, or until the device is reset.
- **Traps** — Indicates if traps are enabled for Multiple Hosts. The possible field values are:
- **Trap Frequency** — Defines the time period by which traps are sent to the host. The Trap Frequency (1-1000000) field can be defined only if multiple hosts are disabled. The default is 10 seconds.
- **Status** — Indicates the host status. If there is an asterisk (*), the port is either not linked or is down. The possible field values are:
  - *Unauthorized* — Indicates that either the port control is Force Unauthorized and the port link is down, or the port control is Auto but a client has not been authenticated via the port.
  - *Not in Auto Mode* — Indicates that the port control is Forced Authorized, and clients have full port access.
  - *Single-host Lock* — Indicates that the port control is Auto and a single client has been authenticated via the port.
  - *No Single Host* — Indicates that Multiple Host is enabled.
- **Number of Violations** — Indicates the number of packets that arrived on the interface in single-host mode, from a host whose MAC address is not the supplicant MAC address.

*Modifying Multiple Host Settings*

1. Click **Security Suite** > **802.1X** > **Multiple Host**. The *802.1X Properties Page* opens:
2. Click the **Edit** button. The *Multiple Host Settings Page* opens:

***Multiple Host Settings Page***




The *Multiple Host Settings Page* contains the following fields:

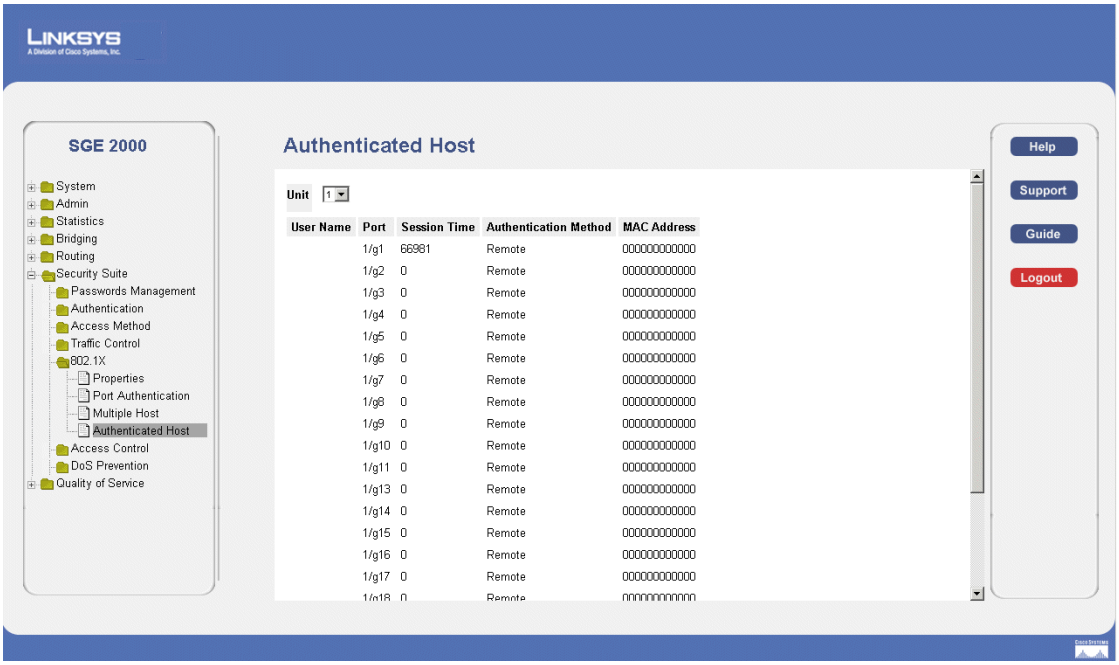
- **Port** — Displays the port number for which advanced port-based authentication is enabled.
- **Enable Multiple Hosts** — Indicates whether multiple hosts are enabled. Multiple hosts must be enabled in order to either disable the ingress-filter, or to use port-lock security on the selected port. The possible field values are:
  - *Checked* — Multiple host mode is enabled.
  - *Unchecked* — Single host mode is enabled. This is the default value.
- **Action on Violation** — Defines the action to be applied to packets arriving in single-host mode, from a host whose MAC address is not the supplicant MAC address. The possible field values are:
  - *Forward* — Forwards the packet.
  - *Discard* — Discards the packets. This is the default value.
  - *DiscardDisable* — Discards the packets and shuts down the port. The ports remains shut down until reactivated, or until the device is reset.
- **Enable Traps** — Indicates if traps are enabled for Multiple Hosts. The possible field values are:
  - *Checked* — Indicates that traps are enabled for Multiple hosts.
  - *Unchecked* — Indicates that traps are disabled for Multiple hosts.
- **Trap Frequency** — Defines the time period by which traps are sent to the host. The Trap Frequency (1-1000000) field can be defined only if multiple hosts are disabled. The default is 10 seconds.

3. Modify the relevant fields.
4. Click **Apply**. The multiple host settings are defined, and the device is updated.

## Defining Authenticated Host

1. Click **Security Suite** > **802.1X** > **Authenticated Host**. The *802.1X Port Authentication Page* opens:

***802.1X Authenticated Host Page***




The *802.1X Authenticated Host Page* contains the following fields:

- **Unit Number** — Displays the stacking member for which the Authenticated Hosts parameters are displayed.
- **User Name** — Lists the supplicants that were authenticated, and are permitted on each port.
- **Port** — Displays the port number.
- **Session time** — Displays the amount of time (in seconds) the supplicant was logged on the port.
- **Authentication Method** — Displays the method by which the last session was authenticated. The possible field values are:
  - *Remote* — 802.1x authentication is not used on this port (port is forced-authorized).
  - *None* — The supplicant was not authenticated.
  - *RADIUS* — The supplicant was authenticated by a RADIUS server.
- **MAC Address** — Displays the supplicant MAC address.

2. Define the relevant fields.
3. Click **Apply**. The authenticated host settings are defined, and the device is updated.

# Defining Access Control

The Access Control section contains the following pages:

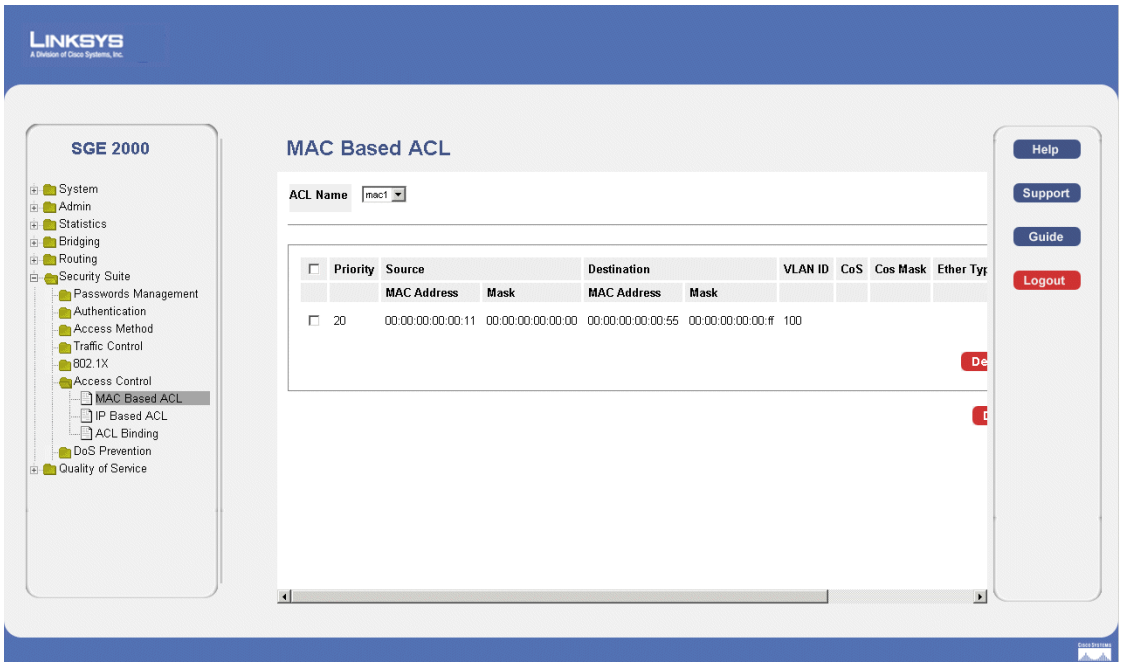
- Defining MAC Based ACL
- Defining IP Based ACL
- Defining ACL Binding

## Defining MAC Based ACL

The *MAC Based ACL Page* page allows a MAC- based ACL to be defined. ACEs can be added only if the ACL is not bound to an interface. To define the MAC Based ACL:

1. Click **Security Suite** >**Access Control** > **MAC Based ACL**. The *MAC Based ACL Page* opens:

***MAC Based ACL Page***

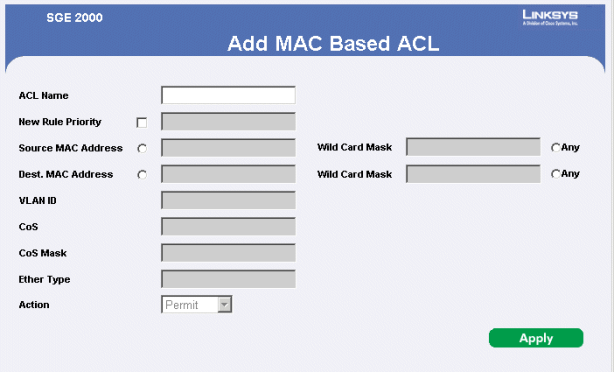



The *MAC Based ACL Page* contains the following fields:

- **ACL Name** — Displays the user-defined MAC based ACLs.
- **Remove ACL** — Deletes the selected ACL.
- **Deny Following Destination MAC Addresses** — Matches the destination MAC address and denies packet access.

2. Click the **Add ACL** button. The *Add MAC Based ACL Page* opens:

***Add MAC Based ACL Page***




The *Add MAC Based ACL Page* contains the following fields:

- **ACL Name** — Displays the user-defined MAC based ACLs.
- **New Rule Priority** — Indicates the ACE priority, which determines which ACE is matched to a packet on a first-match basis. The possible field values are 1-2147483647.
- **Source Address**
  - *MAC Address*s — Matches the source MAC address to which packets are addressed to the ACE.
  - *Mask* — Indicates the source MAC Address wild card mask. Wildcards are used to mask all or part of a source IP Address. Wild card masks specify which bits are used and which bits are ignored. A wild card mask of ff: ff:ff:ff:ff:ff indicates that no bit is important. A wildcard of 00.00.00.00.00.00 indicates that all the bits are important. For example, if the source IP address 14.36.18.19.1.1 and the wildcard mask is 255.36.184.00.00.00, the middle two bits of the IP address are used, while the last three bits are ignored.
- **Destination Address**
  - *MAC Address* — Matches the destination MAC address to which packets are addressed to the ACE.
  - *Mask* — Indicates the destination MAC Address wild card mask. Wildcards are used to mask all or part of a destination IP Address. Wild card masks specify which bits are used and which bits are ignored. A wild card mask of ff: ff:ff:ff:ff:ff indicates that no bit is important. A wildcard of 00.00.00.00.00.00 indicates that all the bits are important. For example, if the source IP address 14.36.18.19.1.1 and the wildcard mask is 255.36.184.00.00.00, the middle two bits of the IP address are used, while the last three bits are ignored.
- **VLAN ID** — Matches the packet's VLAN ID to the ACE. The possible field values are 1 to 4095.
- **CoS** — Class of Service of the packet.
- **CoS Mask** — Wildcard bits to be applied to the CoS.
- **Ether Type** — The Ethernet type of the packet.
- **Action** — Indicates the ACL forwarding action. The possible field values are:

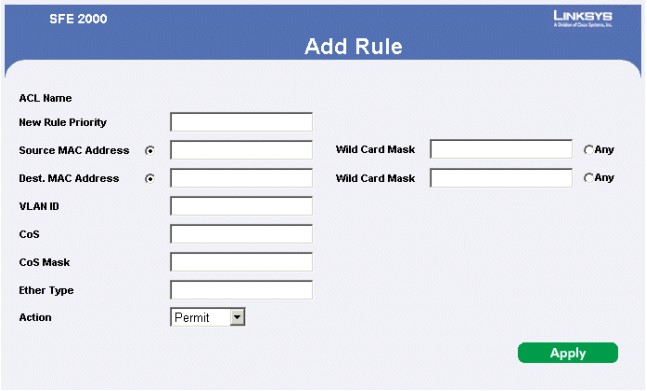
- *Permit* — Forwards packets which meet the ACL criteria.
- *Deny* — Drops packets which meet the ACL criteria.
- *Shutdown* — Drops packet that meet the ACL criteria, and disables the port to which the packet was addressed.

3. Define the relevant fields.
4. Click **Apply**. The MAC Based ACL is defined, and the device is updated.

*Adding Rule to MAC Based ACL*

1. Select an existing ACL.
2. Click the Add Rule button. The *Add Rule Page* opens:

***Add Rule Page***



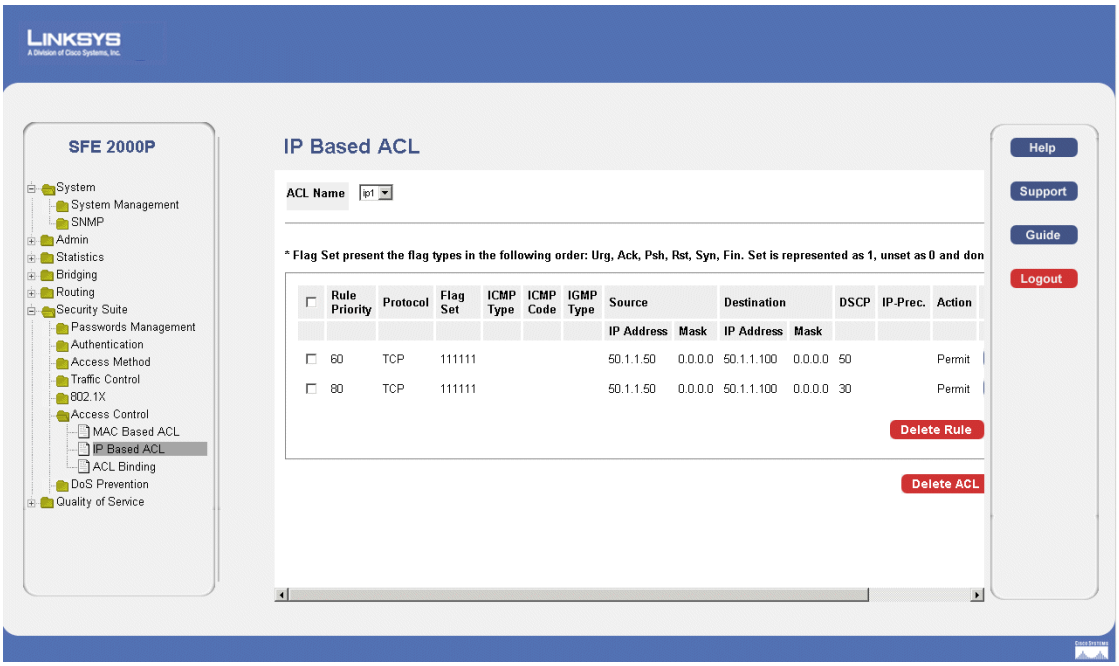

3. Define the relevant fields.
4. Click **Apply**. The ACL Rule is defined, and the device is updated.

## Defining IP Based ACL

The Defining IP Based ACL page contains information for defining IP Based ACLs, including defining the ACEs defined for IP Based ACLs.

1. Click **Security Suite** >**Access Control** > **IP Based ACL**. The *IP Based ACL Page* opens:

***IP Based ACL Page***




The *IP Based ACL Page* contains the following fields:

- **ACL Name** — Displays the user-defined IP based ACLs.
- **Remove ACL** — Deletes the selected ACL.
- **Rule Priority** — Indicates the rule priority, which determines which rule is matched to a packet on a first-match basis.
- **Protocol** — Creates an ACE based on a specific protocol.
  - *Any* — Matches the protocol to any protocol.
  - *IDRP* — Matches the packet to the Inter-Domain Routing Protocol (IDRP).
  - *IDPR* — Matches the packet to the Inter-Domain Policy Routing Protocol (IDPR).
  - *RVSP* — Matches the packet to the ReSerVation Protocol (RSVP).
  - *AH* — Indicates that the Authentication Header (AH) protocol is used to classify network flows.
  - *EIGRP* — Indicates that the Enhanced Interior Gateway Routing Protocol (EIGRP) is used to classify network flows.
  - *OSPF* — Matches the packet to the Open Shortest Path First (OSPF) protocol.
  - *IPIP* — Matches the packet to the IP Protocol
  - *PIM* — Matches the packet to Protocol Independent Multicast (PIM).

  - *L2IP* — Matches the packet to Layer 2 Internet Protocol (L2IP).
  - *ISIS* — Indicates that the Intermediate System to Intermediate System (ISIS) protocol is used to classify network flows.

- **Flag Set** — Sets the indicated TCP flag that can be triggered.
- **ICMP Type** — Filters packets by ICMP message type. The field values is 0-255.
- **ICMP Code** — Indicates and ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code.
- **IGMP Type** — Filters packets by IGMP message or message types.
- **Source**

  **IP Address** — Matches the source port IP address to which packets are addressed to the ACE.

  **Mask** — Defines the source IP address wildcard mask. Wildcard masks specify which bits are used and which bits are ignored. A wild card mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all the bits are important. For example, if the source IP address 149.36.184.198 and the wildcard mask is 255.36.184.00, the first eight bits of the IP address are ignored, while the last eight bits are used.

- **Destination**

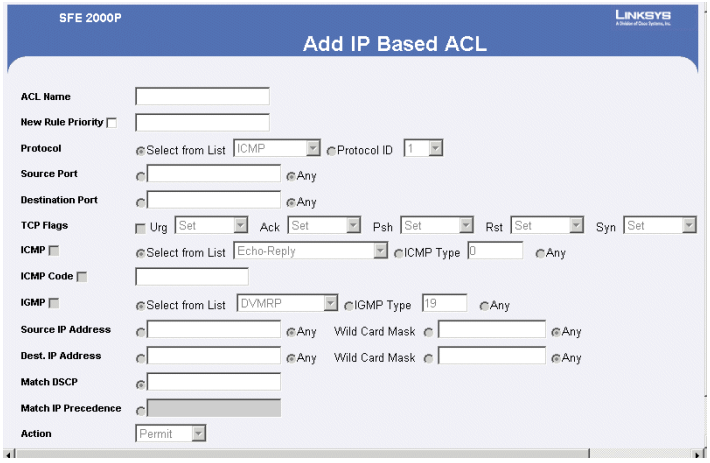
  **IP Address** — Matches the destination port IP address to which packets are addressed to the ACE.

  **Mask** — Defines the destination IP address wildcard mask. Select either **Match DSCP** or **Match IP**

- **DCSP** — Matches the packets DSCP value.
- **IP Prec** — Matches the packet IP Precedence value to the ACE. Either the DSCP value or the IP Precedence value is used to match packets to ACLs. The possible field range is 0-7.
- **Action** — Indicates the action assigned to the packet matching the ACL. Packets are forwarded or dropped. In addition, the port can be shut down, a trap can be sent to the network administrator, or packet is assigned rate limiting restrictions for forwarding. The options are as follows:
  - *Permit* — Forwards packets which meet the ACL criteria.
  - *Deny* — Drops packets which meet the ACL criteria.
  - *Shutdown* — Drops packet that meets the ACL criteria, and disables the port to which the packet was addressed. Ports are reactivated from the *Port Management* page.
  - *Match IP Precedence* — Matches the packet IP Precedence value to the ACE. Either the DSCP value or the IP Precedence value is used to match packets to ACLs. The possible field range is 0-7.

2. Click the **Add** Button. The *Add IP Based ACL Page* opens:

***Add IP Based ACL Page***




The *Add IP Based ACL Page* contains the following fields:

- **ACL Name** — Displays the user-defined IP based ACLs.
- **New Rule Priority** — Indicates the rule priority, which determines which rule is matched to a packet on a first-match basis.
- **Protocol** — Creates an ACE based on a specific protocol.
- **Source Port** — Defines the TCP/UDP source port to which the ACE is matched. This field is active only if **800/6-TCP** or **800/17-UDP** are selected in the **Select from List** drop-down menu. The possible field range is 0 - 65535.
- **Destination Port** — Defines the TCP/UDP destination port. This field is active only if **800/6-TCP** or **800/17-UDP** are selected in the **Select from List** drop-down menu. The possible field range is 0 - 65535.
- **TCP Flags** — Filters packets by TCP flag. Filtered packets are either forwarded or dropped. Filtering packets by TCP flags increases packet control, which increases network security. The possible field values are:
- **ICMP** — Indicates if ICMP packets are permitted on the network. The possible field values are as follows:.
- **ICMP Code** — Indicates and ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code.
- **IGMP** — Filters packets by IGMP message or message types.
- **Source IP Address** — Matches the source port IP address to which packets are addressed to the ACE.
- **Dest. IP Address** — Matches the destination port IP address to which packets are addressed to the ACE.
- **Match DSCP** — Matches the packet to the DSCP tag value.

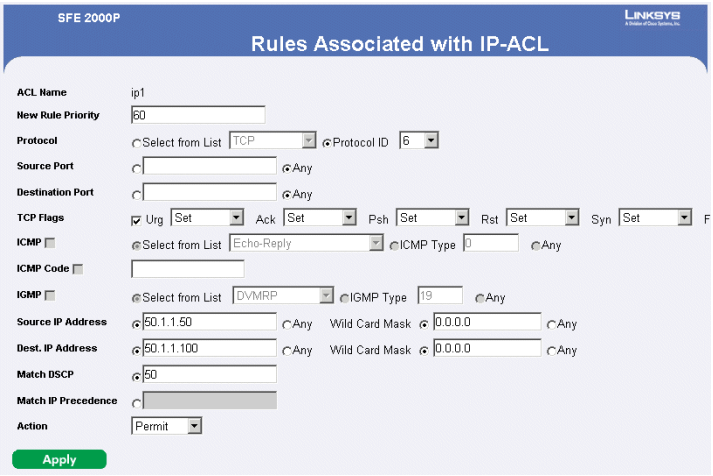
- **Match IP Precedence** — Matches the packet IP Precedence value to the ACE. Either the DSCP value or the IP Precedence value is used to match packets to ACLs. The possible field range is 0-7.
- **Action** — Indicates the action assigned to the packet matching the ACL. Packets are forwarded or dropped. In addition, the port can be shut down, a trap can be sent to the network administrator, or packet is assigned rate limiting restrictions for forwarding. The options are as follows:
  - *Permit* — Forwards packets which meet the ACL criteria.
  - *Deny* — Drops packets which meet the ACL criteria.
  - *Shutdown* — Drops packet that meets the ACL criteria, and disables the port to which the packet was addressed. Ports are reactivated from the *Port Management* page.

3. Define the relevant fields,
4. Click **Apply**. The IP Based ACL is defined, and the device is updated.

*Defining Rules Associated with IP-ACL*

1. Click **Security Suite** >**Access Control** > **IP Based ACL**. The *IP Based ACL Page* opens:
2. Click the **ACL Rule** button. The *Rules Associated with IP-ACL Page* opens:

***Rules Associated with IP-ACL Page***




The *Rules Associated with IP-ACL Page* contains the following fields:

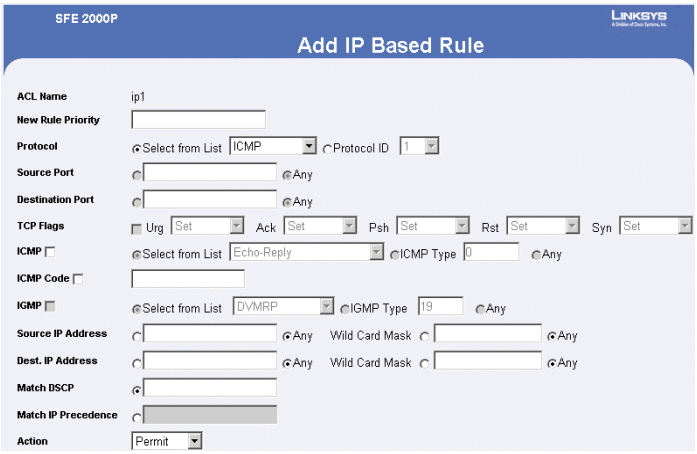
- **ACL Name** — Displays the user-defined IP based ACLs.
- **New Rule Priority** — Indicates the rule priority, which determines which rule is matched to a packet on a first-match basis.
- **Protocol** — Creates an ACE based on a specific protocol.
- **TCP Flags** — Filters packets by TCP flag. Filtered packets are either forwarded or dropped. Filtering packets by TCP flags increases packet control, which increases network security. The possible field values are:

- **ICMP** — Indicates if ICMP packets are permitted on the network. The possible field values are as follows:.
- **ICMP Code** — Indicates and ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code.
- **IGMP** — Filters packets by IGMP message or message types.
- **Source IP Address** — Matches the source port IP address to which packets are addressed to the ACE.
- **Dest. IP Address** — Matches the destination port IP address to which packets are addressed to the ACE.
- **Match DSCP** — Matches the packet to the DSCP tag value.
- **Match IP Precedence** — Matches the packet IP Precedence value to the ACE. Either the DSCP value or the IP Precedence value is used to match packets to ACLs. The possible field range is 0-7.
- **Source Port** — Defines the TCP/UDP source port to which the ACE is matched. This field is active only if **800/6-TCP** or **800/17-UDP** are selected in the **Select from List** drop-down menu. The possible field range is 0 - 65535.
- **Destination Port** — Defines the TCP/UDP destination port. This field is active only if **800/6-TCP** or **800/17-UDP** are selected in the **Select from List** drop-down menu. The possible field range is 0 - 65535.
- **Action** — Indicates the action assigned to the packet matching the ACL. Packets are forwarded or dropped. In addition, the port can be shut down, a trap can be sent to the network administrator, or packet is assigned rate limiting restrictions for forwarding. The options are as follows:
  - *Permit* — Forwards packets which meet the ACL criteria.
  - *Deny* — Drops packets which meet the ACL criteria.
  - *Shutdown* — Drops packet that meets the ACL criteria, and disables the port to which the packet was addressed. Ports are reactivated from the *Port Management* page.

*Adding an IP Based Rule*

1. Click **Security Suite** > **Access Control** > **IP Based ACL**. The *IP Based ACL Page* opens:
2. Click the **Add ACL Rule** button. The *Add IP Based Rule Page* opens:

***Add IP Based Rule Page***




The *Add IP Based Rule Page* contains the following fields:

- **ACL Name** — Displays the user-defined IP based ACLs.
- **New Rule Priority** — Indicates the rule priority, which determines which rule is matched to a packet on a first-match basis.
- **Protocol** — Creates an ACE based on a specific protocol.
- **Source Port** — Defines the TCP/UDP source port to which the ACE is matched. This field is active only if **800/6-TCP** or **800/17-UDP** are selected in the **Select from List** drop-down menu. The possible field range is 0 - 65535.
- **Destination Port** — Defines the TCP/UDP destination port. This field is active only if 800/6-TCP or 800/17-UDP are selected in the Select from List drop-down menu. The possible field range is 0 - 65535.
- **TCP Flags** — Filters packets by TCP flag. Filtered packets are either forwarded or dropped. Filtering packets by TCP flags increases packet control, which increases network security. The possible field values are:
- **ICMP** — Indicates if ICMP packets are permitted on the network. The possible field values are as follows:.
- **ICMP Code** — Indicates and ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code.
- **IGMP** — Filters packets by IGMP message or message types.
- **Source IP Address** — Matches the source port IP address to which packets are addressed to the ACE.
- **Dest. IP Address** — Matches the destination port IP address to which packets are addressed to the ACE.
- **Match DSCP** — Matches the packet to the DSCP tag value.

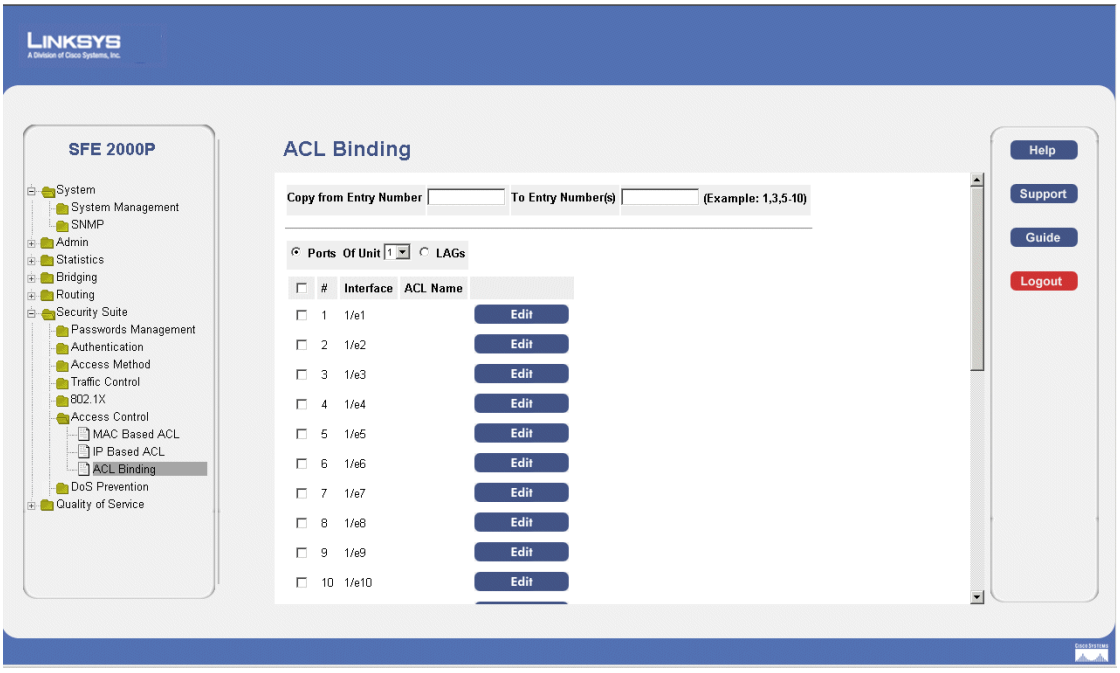
- **Match IP Precedence** — Matches the packet IP Precedence value to the ACE. Either the DSCP value or the IP Precedence value is used to match packets to ACLs. The possible field range is 0-7.
- **Action** — Indicates the action assigned to the packet matching the ACL. Packets are forwarded or dropped. In addition, the port can be shut down, a trap can be sent to the network administrator, or packet is assigned rate limiting restrictions for forwarding. The options are as follows:
  - *Permit* — Forwards packets which meet the ACL criteria.
  - *Deny* — Drops packets which meet the ACL criteria.
  - *Shutdown* — Drops packet that meets the ACL criteria, and disables the port to which the packet was addressed. Ports are reactivated from the *Port Management* page.

## Defining ACL Binding

When an ACL is bound to an interface, all the ACE rules that have been defined are applied to the selected interface. Whenever an ACL is assigned on a port or a LAG flows from that ingress interface that do not match the ACL are matched to the default rule, which is Drop unmatched packets.

1. Click **Security Suite** > **Access Control** > **ACL Binding**. The *ACL Binding Page* opens

***ACL Binding Page***




The *ACL Binding Page* contains the following fields:

- **Copy From Entry Number** — Indicates the ports/LAGs from which the ACL are copied.
- **To Entry Number(s)** — Indicates the ports/LAGs to which the ACL are copied.
- **Ports** — Displays the ports bound by the ACL.

- **LAGs** — Displays the LAGs bound by the ACL.
- **Of Unit** — Displays the stacking member for which the ACL binding parameters are displayed.
- **Interface** — Indicates the interface to which the ACL is bound.
- **ACL Name** — Indicates the ACL which is bound the interface.

*Modifying ACL Binding*

1. Click **Security Suite** > **Access Control** > **ACL Binding**. The *ACL Binding Page* opens:
2. Click the **Edit** button. The **Bind ACL Page** opens:

***Bind ACL Page***

The *Bind ACL Page* contains the following fields:

- **Interface** — Indicates the interface to which the ACL is bound.
- **Select ACL** — Indicates the ACL which is bound the interface.

3. Define the relevant fields.
4. Click **Apply.** ACL binding is defined, and the device is updated.

# Defining DOS Prevention

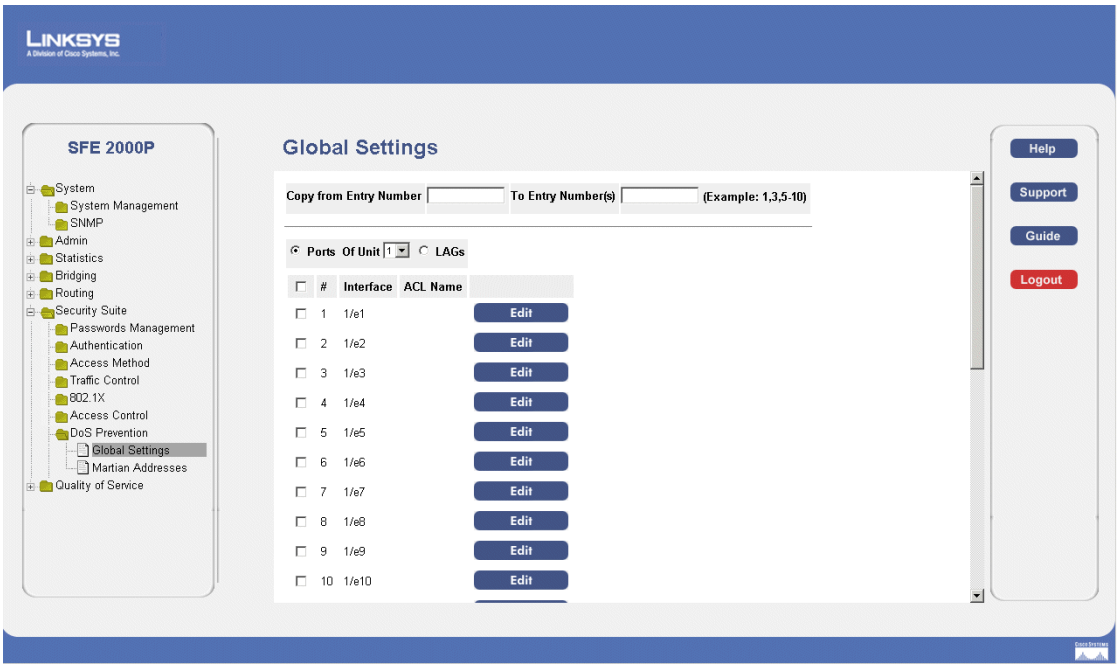
The DOS Prevention section contains the following pages:

- Global Settings
- Defining Martian Addresses

## Global Settings

1. Click **Security Suite** > **Dos Prevention** > **Global Settings**. The *Global Settings Page* opens:

***Global Settings Page***




The *Global Settings Page* contains the following fields:

- **Security Suite Status** — Indicates if DOS security is enabled on the device. The possible field values are:
  - *Enable* — Enables DOS security.
  - *Disable* — Disables DOS security on the device. This is the default value.
- **Denial of Service Protection** — Indicates if service is enabled. If the service protection is disabled, the *Stacheldraht Distribution*, *Invasor Trojan*, and *Back Office Trojan* fields are disabled.
- **Stacheldraht Distribution** — Discard TCP packets with source TCP port equal to 16660
- **Invasor Trojan** — Discard TCP packets with destination TCP port equal to 2140 and source TCP port equal to 1024.
- **Back Office Trojan** — Discard UDP packets with destination UDP port equal to 31337 and source UDP port equal to 1024.

2. Define the relevant fields.
3. Click **Apply**. The Dos prevention global settings are defined, and the device is updated.

## Defining Martian Addresses

1. Click **Security Suite** > **Dos Prevention** > **Martian Addresses**. The *Martian Addresses Page* opens:

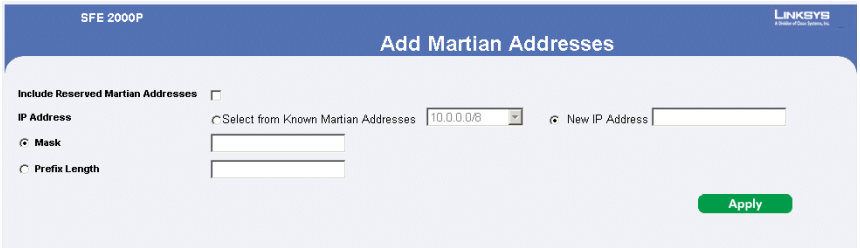
***Martian Addresses Page***

The *Martian Addresses Page* contains the following fields:

- **IP Address** — Displays the IP addresses for which DOS attack is enabled.
- **Mask** — Displays the Mask for which DOS attack is enabled.

2. Click the **Add** button. The *Add Martian Addresses Page* opens:

***Add Martian Addresses Page***




The *Add Martian Addresses Page* contains the following fields:

- **Include Reserved Martian Addresses** — Indicates that packets arriving from Martian addresses are dropped. When enabled, the following IP addresses are included:
  - 0.0.0.0/8 (except 0.0.0.0/32), 127.0.0.0/8

  - 192.0.2.0/24, 224.0.0.0/4
  - 240.0.0.0/4 (except 255.255.255.255/32)

- **IP Address** — Enter the IP addresses for which DOS attack is enabled.
- **Mask** — Enter the Mask for which DOS attack is enabled.
- **Prefix Length** — Defines the IP route prefix for the destination IP.

3. Define the relevant fields.
4. Click **Apply**. The martian addresses are added, and the device is updated.

# Configuring Device Interfaces

This section contains information for configuring ports and contains the following topic:

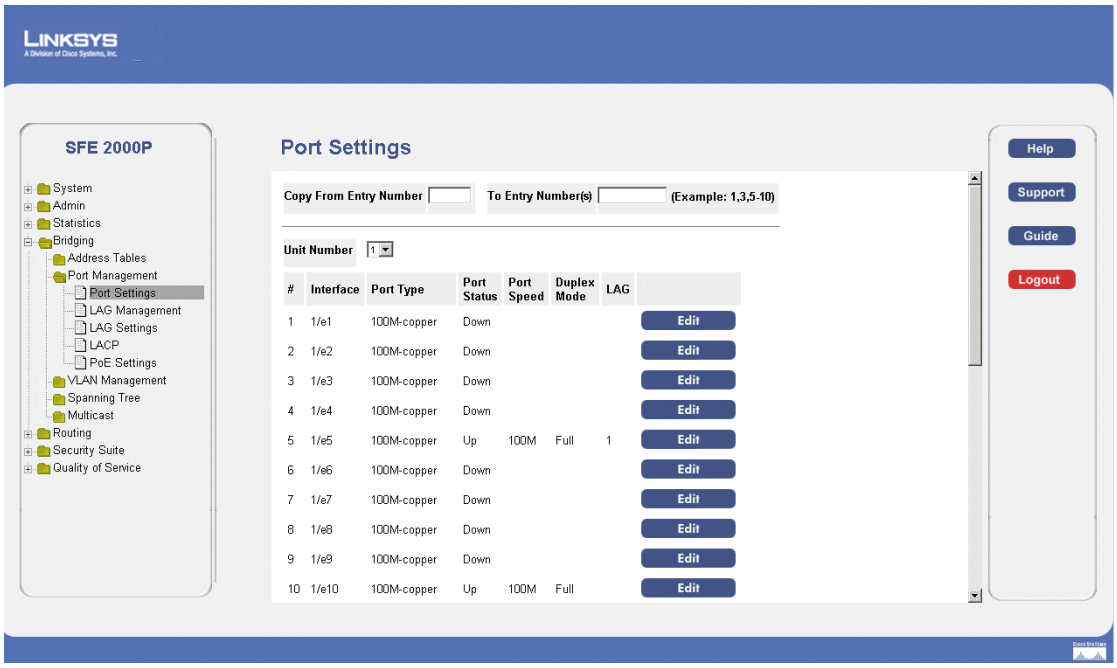
- Defining Port Settings
- Defining LAG Management
- Defining LAG Settings
- Configuring LACP

## Defining Port Settings

The Port Settings Page contains fields for defining port parameters. To define port settings:

1. Click **Bridging** > **Port Management** > **Port Settings**. The Port Settings Page opens:

***Port Settings Page***




The Port Settings Page contains the following fields:

- **Copy from Entry Number** — Copies port information from the selected port.
- **to Entry Number(s)** — Copies port information to the selected port.
- **Unit Number** — Indicates the stacking member for which the ports are defined.
- **Interface** — Displays the port number.

- **Port Type** — Displays the port type. The possible field values are:
  - *Copper/ComboF/ComboC* — Indicates the port has a copper port connection.
  - *Fiber* — Indicates the port has a fiber optic port connection.
- **Port Status —** Displays the port connection status.
- **Port Speed —** Displays the current port speed.
- **Duplex Mode** — Displays the port duplex mode. This field is configurable only when auto negotiation is disabled, and the port speed is set to 10M or 100M. This field cannot be configured on LAGs. The possible field values are:
  - *Full* **—** Indicates that the interface supports transmission between the device and the client in both directions simultaneously.
  - *Half* **—** Indicates that the interface supports transmission between the device and the client in only one direction at a time.
- **PVE** — Indicates that this port is protected by an uplink, so that the forwarding decisions are overwritten by those of the port that protects it.
- **LAG** — Defines if the port is part of a Link Aggregation (LAG).

2. Define the relevant fields.
3. Click **Apply**. Port Settings are defined, and the device is updated.

*Modifying Port Settings*

1. Click **Bridging** > **Port Management** > **Port Settings**. The Port Settings Page opens:
2. Click the **Edit** button. The *Edit Port Settings Page* opens:

***Edit Port Settings Page***

The *Edit Port Settings Page* contains the following fields:

- **Port** — Displays the port number.
- **Description** — Displays the device port ID.
- **Port Type** — Displays the port type. The possible field values are:
  - *Copper/ComboF/ComboC* — Indicates the port has a copper port connection.
  - *Fiber* — Indicates the port has a fiber optic port connection.
- **Admin Status** — Enables or disables traffic forwarding through the port.
- **Current Port Status —** Displays the port connection status.
- **Reactivate Suspended Port** — Reactivates a port if the port has been disabled through the locked port security option.
- **Operational Status** — Defines whether the port is currently operational or non-operational.
- **Admin Speed** — The configured rate for the port. The port type determines what speed setting options are available. You can designate admin speed only when the port auto-negotiation is disabled.
- **Current Port Speed —** Displays the current port speed.
- **Admin Duplex —** Displays the port duplex mode. This field is configurable only when auto negotiation is disabled, and the port speed is set to 10M or 100M. This field cannot be configured on LAGs. The possible field values are:

  - *Full* — Indicates that the interface supports transmission between the device and the client in both directions simultaneously.
  - *Half* — Indicates that the interface supports transmission between the device and the client in only one direction at a time.

- **Current Duplex Mode —** Displays the port current duplex mode.
- **Auto Negotiation** — Enables Auto Negotiation on the port. Auto Negotiation is a protocol between two link partners that enables a port to advertise its transmission rate, duplex mode and flow control abilities to its partner.
- **Current Auto Negotiation** — Displays the Auto Negotiation status on the port.
- **Admin Advertisement** — Specifies the capabilities to be advertised by the Port. The possible field values are:
  - *Max Capability* — Indicates that all port speeds and Duplex mode settings can be accepted.
  - *10 Half* — Indicates that the port is advertising a 10 mbps speed and half Duplex mode setting.
  - *10 Full* — Indicates that the port is advertising a 10 mbps speed and full Duplex mode setting.
  - *100 Half* — Indicates that the port is advertising a 100 mbps speed and half Duplex mode setting.
  - *100 Full* — Indicates that the port is advertising a 100 mbps speed and full Duplex mode setting.
  - *1000* — Indicates that the port is advertising a 1000 mbps speed and full Duplex mode setting.
- **Current Advertisement** — The port advertises its capabilities to its neighbor port to start the negotiation process. The possible field values are those specified in the Admin Advertisement field.
- **Neighbor Advertisement** — The neighbor port (the port to which the selected interface is connected) advertises its capabilities to the port to start the negotiation process. The possible values are those specified in the Admin Advertisement field.
- **Back Pressure** — Enables Back Pressure mode on the port. Back Pressure mode is used with Half Duplex mode to disable ports from receiving messages. The Back Pressure mode is configured for ports currently in the Half Duplex mode or on LAGs.
- **Current Back Pressure** — Displays the Back Pressure mode on the port.
- **Flow Control** — Enables or disables flow control or enables the auto negotiation of flow control on the port.
- **Current Flow Control** — Displays the current Flow Control setting.

- **MDI/MDIX** — Displays the Media Dependent Interface (MDI)/Media Dependent Interface with Crossover (MDIX) status on the port. Hubs and switches are deliberately wired opposite the way end stations are wired, so that when a hub or switch is connected to an end station, a straight through Ethernet cable can be used, and the pairs are matched up properly. When two hubs or switches are connected to each other, or two end stations are connected to each other, a crossover cable is used to ensure that the correct pairs are connected. The possible field values are:
  - *MDIX* — Use for hubs and switches.
  - *Auto* — Use to automatically detect the cable type.
  - *MDI* — Use for end stations.
- **Current MDI/MDIX —** Displays the current MDI/MDIX setting.
- **LAG** — Defines if the port is part of a Link Aggregation (LAG).
- **PVE** — Indicates that this port is protected by an uplink, so that the forwarding decisions are overwritten by those of the port that protects it.

3. Define the relevant fields.
4. Click **Apply**. The Port Settings are modified, and the device is updated.

# Defining LAG Management

Link Aggregation optimizes port usage by linking a group of ports together to form a single LAG. Aggregating ports multiplies the bandwidth between the devices, increases port flexibility, and provides link redundancy.

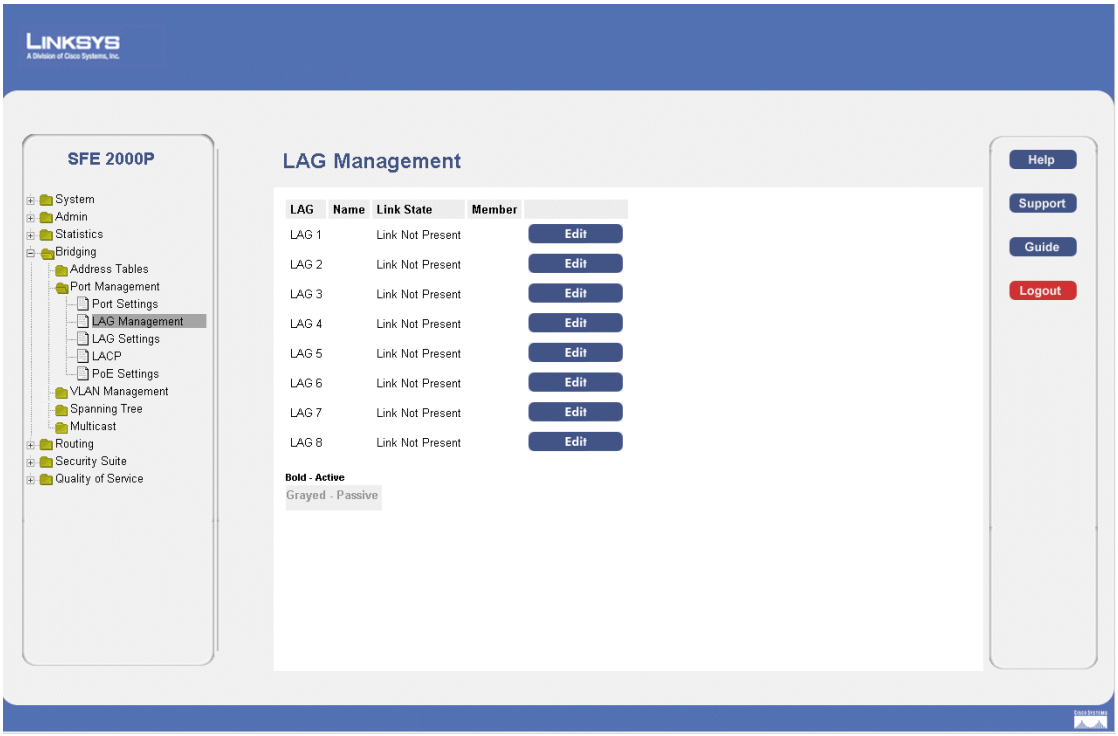
The device supports both static LAGs and *Link Aggregation Control Protocol* (LACP) LAGs. LACP LAGs negotiate aggregating port links with other LACP ports located on a different device. If the other device ports are also LACP ports, the devices establish a LAG between them. Ensure the following:

- All ports within a LAG must be the same media type.
- A VLAN is not configured on the port.
- The port is not assigned to a different LAG.
- Auto-negotiation mode is not configured on the port.
- The port is in full-duplex mode.
- All ports in the LAG have the same ingress filtering and tagged modes.
- All ports in the LAG have the same back pressure and flow control modes.
- All ports in the LAG have the same priority.
- All ports in the LAG have the same transceiver type.
- The device supports up to 64 LAGs, and eight ports in each LAG.
- Ports can be configured as LACP ports only if the ports are not part of a previously configured LAG.

Ports added to a LAG lose their individual port configuration. When ports are removed from the LAG, the original port configuration is applied to the ports. To define Lag management:

1. Click **Bridging** > **Port Management** > **Lag Management.** The *Lag Management Page* opens:

***Lag Management Page***




The *Lag Management Page* contains the following fields.

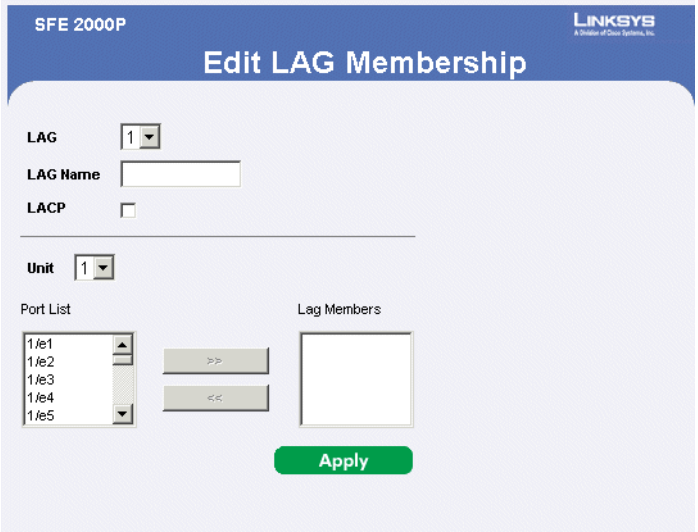
- **LAG** — Displays the LAG number.
- **Name** — Displays the LAG name.
- **Link State** — Displays the link operational status.
- **Member** — Displays the ports configured to the LAG.

2. Define the relevant fields.
3. Click **Apply**. Lag Management is defined, and the device is updated.

*Modifying Lag Membership*

1. Click **Bridging** > **Port Management** > **Lag Management.** The *Lag Management Page* opens:
2. Click the **Edit** button. The *Edit LAG Membership Page* opens:

*Edit LAG Membership Page*




The *Edit LAG Membership Page* contains the following fields.

- **LAG** — Displays the LAG number.
- **LAG Name** — Displays the LAG name.
- **LACP** — Indicates that LACP is enable on the LAG.
- **Unit Number** — Displays the stacking member for which LAG information is defined.

3. Define the relevant fields.
4. Click **Apply**. The Lag membership is defined, and the device is updated.

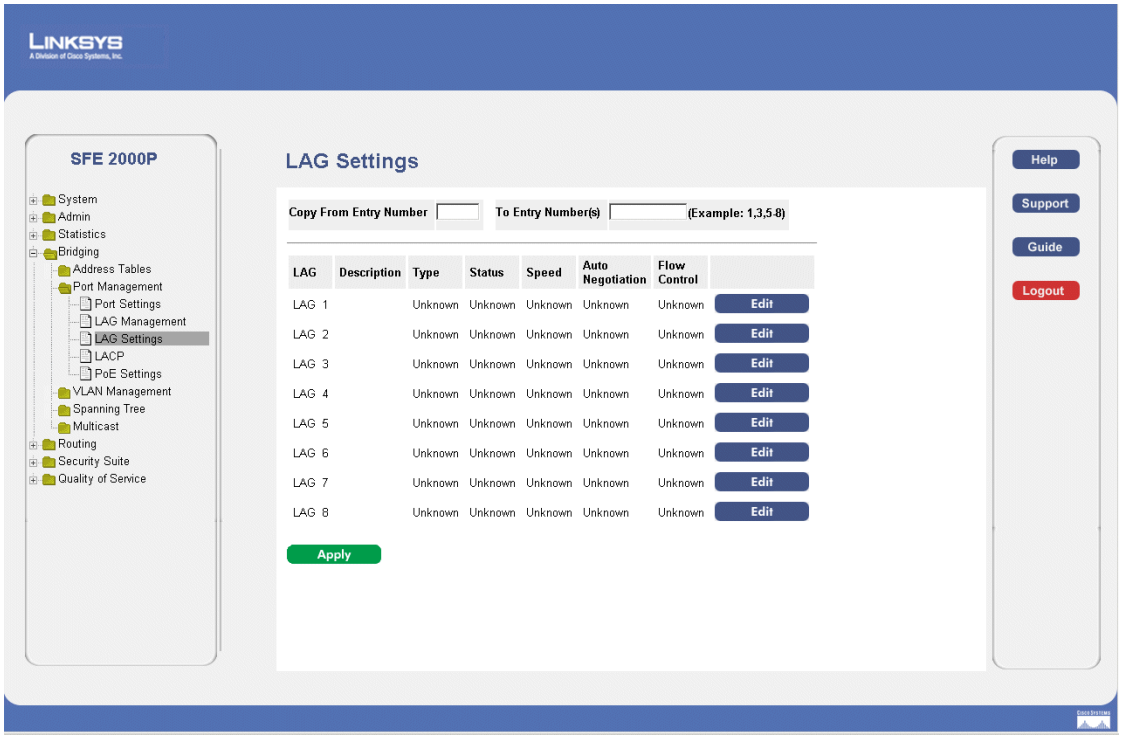
# Defining LAG Settings

Link Aggregated Groups optimize port usage by linking a group of ports together to form a single aggregated group. Link aggregated groups multiply the bandwidth between the devices, increase port flexibility, and provide link redundancy.

The *Lag Settings Page* contains fields for configuring parameters for configured LAGs. The device supports up to eight ports per LAG, and eight LAGs per system.

1. Click **Bridging** > **Port Management** > **Lag Settings**. The *Lag Settings Page* opens:

***Lag Settings Page***

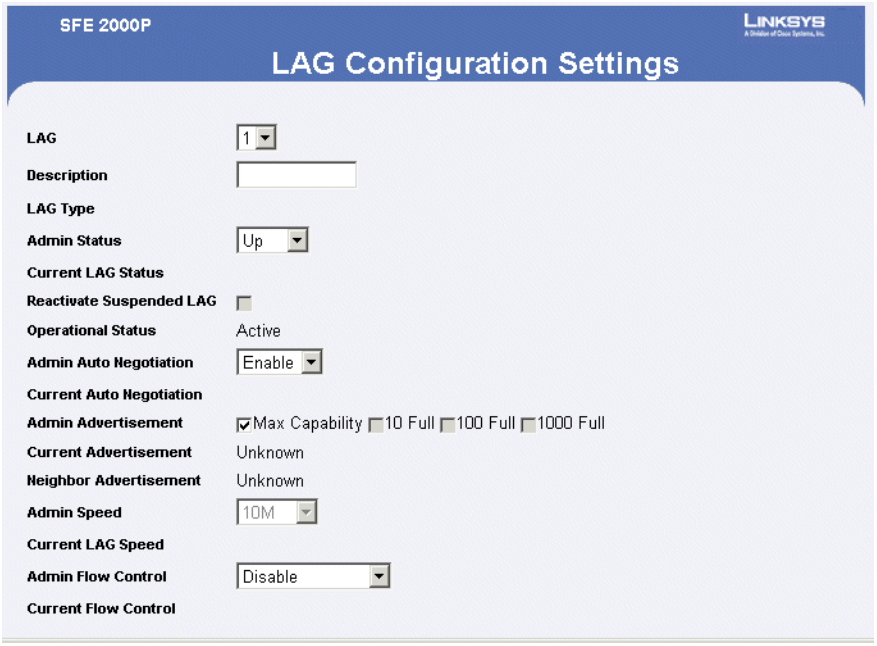



The *Lag Settings Page* contains the following fields:

- **Copy from Entry Number** — Copies the LAG information from the selected port.
- **To Entry Number(s)** — Indicates the ports to which the port QoS information is copied.
- **LAG** — Displays the LAG Id number.
- **Description** — Displays the user-defined port name.
- **Type** — The port types that comprise the LAG.
- **Status** — Indicates if the LAG is currently operating.
- **Speed** — The configured speed at which the LAG is operating.
- **Auto Negotiation** — The current Auto Negotiation setting.
- **Flow Control** — The user-designated Flow Control setting.

2. Click the **Edit** button. The *Lag Configuration Settings* opens:

*Lag Configuration Settings*




The *Lag Configuration Settings* contains the following fields:

- **LAG** — Displays the LAG Id number.
- **Description** — Displays the user-defined port name.
- **LAG Type** — The port types that comprise the LAG.
- **Admin Status** — Enables or disables traffic forwarding through the selected LAG.
- **Current LAG Status** — Indicates if the LAG is currently operating.
- **Reactivate Suspended LAG** — Reactivates a port if the LAG has been disabled through the locked port security option.
- **Operational Status** — Defines whether the LAG is currently operational or non-operational.
- **Admin Auto Negotiation** — Enables or disables Auto Negotiation on the LAG. Auto-negotiation is a protocol between two link partners that enables a LAG to advertise its transmission rate, duplex mode and flow control (the flow control default is disabled) abilities to its partner.
- **Current Auto Negotiation** — The current Auto Negotiation setting.
- **Admin Advertisement** — Specifies the capabilities to be advertised by the LAG. The possible field values are:
  - Max Capability — Indicates that all LAG speeds and Duplex mode settings can be accepted.
  - 10 Half — Indicates that the LAG is advertising a 10 mbps speed and half Duplex mode setting.

  - 10 Full — Indicates that the LAG is advertising a 10 mbps speed and full Duplex mode setting.
  - 100 Half —Indicates that the LAG is advertising a 100 mbps speed and half Duplex mode setting.
  - 100 Full — Indicates that the LAG is advertising a 100 mbps speed and full Duplex mode setting.
  - 1000 — Indicates that the LAG is advertising a 1000 mbps speed and full Duplex mode setting.

- **Current Advertisement** — The LAG advertises its capabilities to its neighbor LAG to start the negotiation process. The possible field values are those specified in the Admin Advertisement field.
- **Neighbor Advertisement** — The neighbor LAG (the LAG to which the selected interface is connected) advertises its capabilities to the LAG to start the negotiation process. The possible values are those specified in the Admin Advertisement field.
- **Admin Speed** — The configured speed at which the LAG is operating.
- **Current LAG Speed** — The current speed at which the LAG is operating.
- **Admin Flow Control** — Enables or disables flow control or enables the auto negotiation of flow control on the LAG.
- **Current Flow Control** — The user-designated Flow Control setting.

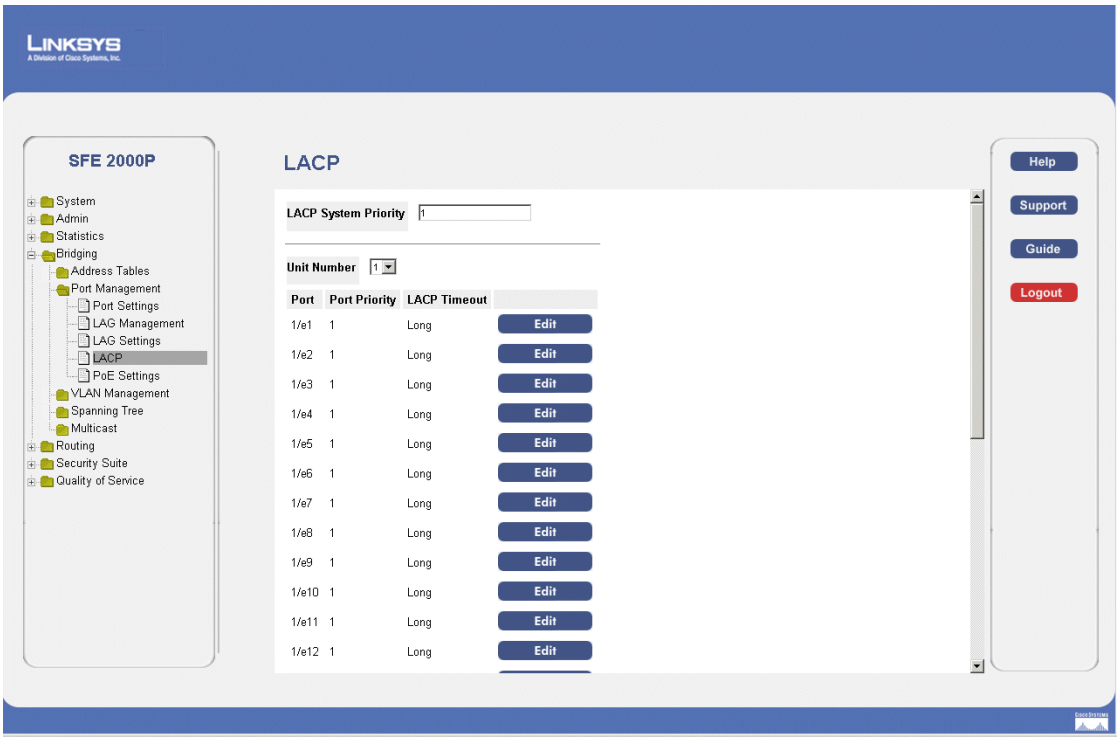
# Configuring LACP

Aggregate ports can be linked into link-aggregation port-groups. Each group is comprised of ports with the same speed, set to full-duplex operations.

Aggregated Links can be manually setup or automatically established by enabling Link Aggregation Control Protocol (LACP) on the relevant links. Aggregate ports can be linked into link-aggregation port-groups. Each group is comprised of ports with the same speed. To define LACP:

1. Click **Bridging** > **Port Managing** > **LACP**. The *LACP Page* opens:

***LACP Page***



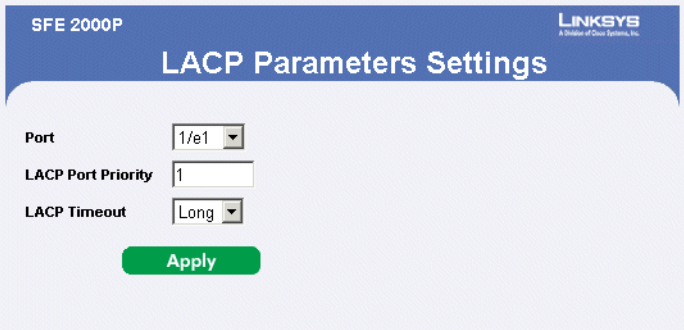

The *LACP Page* contains fields for configuring LACP LAGs.

- **LACP System Priority** — Indicates the global LACP priority value. The possible range is 1-65535. The default value is 1.
- **Unit Number** — Displays the stacking member for which LACP information is defined.
- **Port** — Defines the port number to which timeout and priority values are assigned.
- **Port Priority** — Defines the LACP priority value for the port. The field range is 1-65535.
- **LACP Timeout** — Administrative LACP timeout. The possible field values are:
  - *Short* — Defines a short timeout value.
  - *Long* — Defines a long timeout value. This is the default value.

*Modify LACP Parameter Settings*

1. Click **Bridging** > **Port Managing** > **LACP**. The *LACP Page* opens:
2. Click the **Edit** button. The *LACP Parameter Settings Page* opens:

***LACP Parameter Settings Page***




The *LACP Parameter Settings Page contains the following fields:*

- **Port** — Defines the port number to which timeout and priority values are assigned.
- **LACP Port Priority** — Defines the LACP priority value for the port. The field range is 1-65535.
- **LACP Timeout** — Administrative LACP timeout. The possible field values are:
  - *Short* — Defines a short timeout value.
  - *Long* — Defines a long timeout value. This is the default value.

3. Define the relevant fields.
4. Click **Apply**. The LACP Parameters settings are defined, and the device is updated.

# Configuring VLANs

VLANs are logical subgroups with a Local Area Network (LAN) which combine user stations and network devices into a single unit, regardless of the physical LAN segment to which they are attached. VLANs allow network traffic to flow more efficiently within subgroups. VLANs use software to reduce the amount of time it takes for network changes, additions, and moves to be implemented.

VLANs have no minimum number of ports, and can be created per unit, per device, or through any other logical connection combination, since they are software-based and not defined by physical attributes.

VLANs function at Layer 2. Since VLANs isolate traffic within the VLAN, a Layer 3 router working at a protocol level is required to allow traffic flow between VLANs. Layer 3 routers identify segments and coordinate with VLANs. VLANs are Broadcast and Multicast domains. Broadcast and Multicast traffic is transmitted only in the VLAN in which the traffic is generated.

VLAN tagging provides a method of transferring VLAN information between VLAN groups. VLAN tagging attaches a 4-byte tag to packet headers. The VLAN tag indicates to which VLAN the packets belong. VLAN tags are attached to the VLAN by either the end station or the network device. VLAN tags also contain VLAN network priority information.

Combining VLANs and GARP (Generic Attribute Registration Protocol) allows network managers to define network nodes into Broadcast domains. The VLAN Management section contains the following pages:

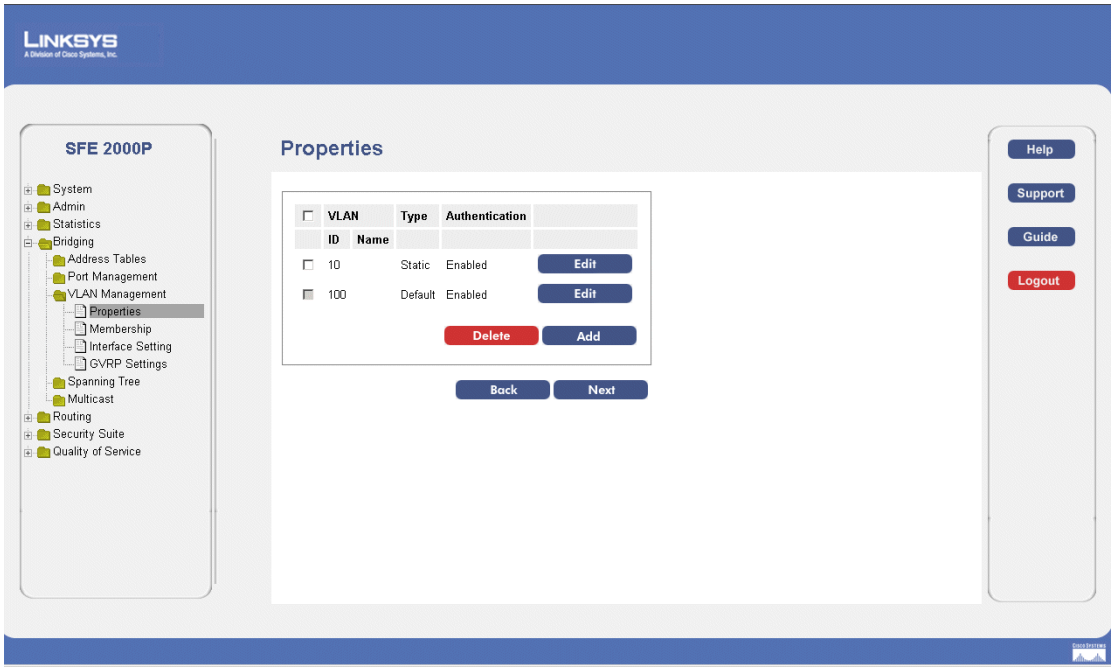
- Defining VLAN Properties
- Defining VLAN Membership
- Defining Interface Settings
- Configuring GVRP Settings

# Defining VLAN Properties

The VLAN *Properties Page* provides information and global parameters for configuring and working with VLANs.

1. Click **Bridging** > **VLAN Management** > **Properties**. The *Properties Page* opens.

***Properties Page***

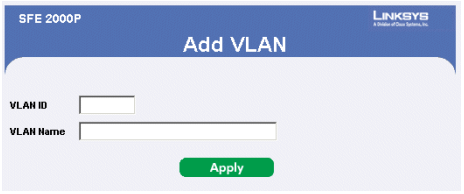



The *Properties Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the user-defined VLAN name.
- **Type** — Displays the VLAN type. The possible field values are:
  - *Dynamic* — Indicates the VLAN was dynamically created through GARP.
  - *Static* — Indicates the VLAN is user-defined.
  - *Default* — Indicates the VLAN is the default VLAN.
- **Authentication** — Indicates whether unauthorized users can access a Guest VLAN. The possible field values are:
  - *Enable* — Enables unauthorized users to use the Guest VLAN.
  - *Disable* — Disables unauthorized users from using the Guest VLAN.

2. Click the **Add** button. The *Add VLAN Page* opens:

***Add VLAN Page***



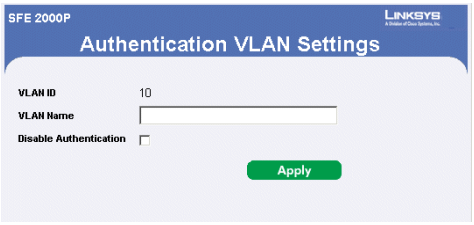

The *Add VLAN Page* allows network administrators to define and configure new VLANs, contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the user-defined VLAN name.

*Modifying VLANs*

1. Click **Bridging** > **VLAN Management** > **Properties**. The *Properties Page* opens.
2. Click **Edit.** The *Authentication VLAN Settings Page* opens:

***Authentication VLAN Settings Page***




The *Authentication VLAN Settings Page* contains information for enabling VLAN guest authentication, and includes the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the VLAN name.
- **Disable Authentication** — Indicates whether unauthorized users can access a Guest VLAN. The possible field values are:
  - *Enable* — Enables unauthorized users to use the Guest VLAN.
  - *Disable* — Disables unauthorized users from using the Guest VLAN.
- **Unit Number** — Displays the stacking member for which the VLAN parameters are displayed.

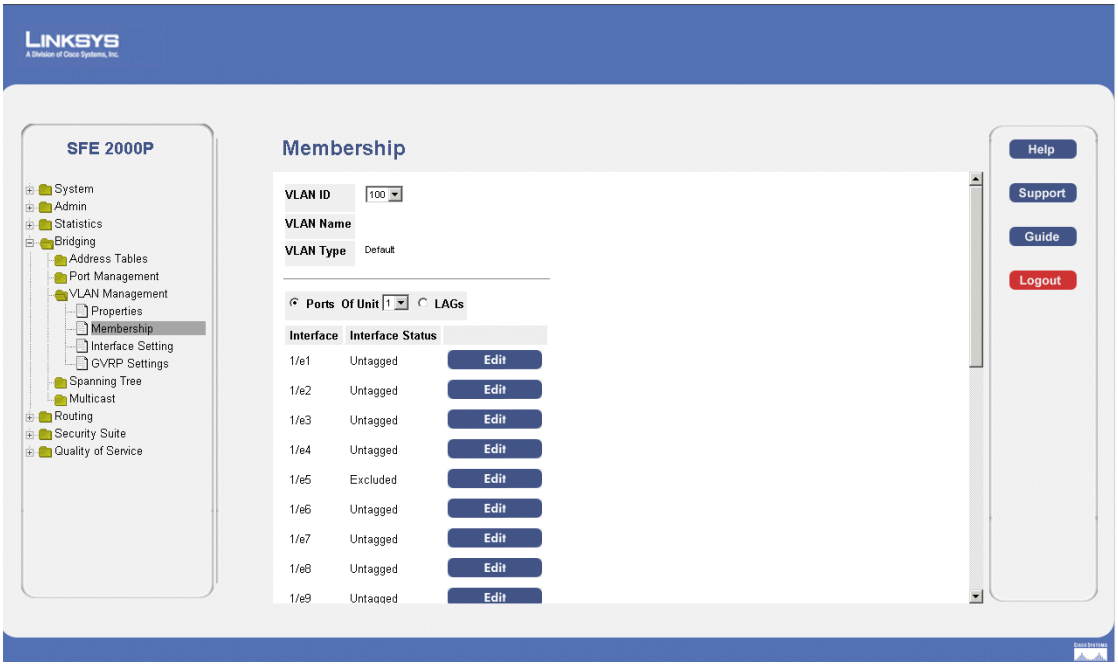
3. Define the relevant fields.
4. Click **Apply**. The VLAN Settings are defined, and the device is updated.

# Defining VLAN Membership

The VLAN *Membership Page* contains a table that maps VLAN parameters to ports. Ports are assigned VLAN membership by toggling through the Port Control settings.

1. Click **Bridging** > **VLAN Management** > **Membership**. The *VLAN Membership Page* opens:

***Membership Page***




The *Membership Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the VLAN name.
- **VLAN Type** — Indicates the VLAN type. The possible field values are:
  - *Dynamic* — Indicates the VLAN was dynamically created through GARP.
  - *Static* — Indicates the VLAN is user-defined.
  - *Default* — Indicates the VLAN is the default VLAN.
- **Port** — Indicates that ports are indicated in the page.
- **LAG** — Indicates that LAGs are indicated in the page.
- **Of Unit** — Displays the stacking member for which the VLAN parameters are displayed.
- **Interface** — Displays the interface configuration being displayed.
- **Interface Status** — Indicates the interface status. the options areas follows:

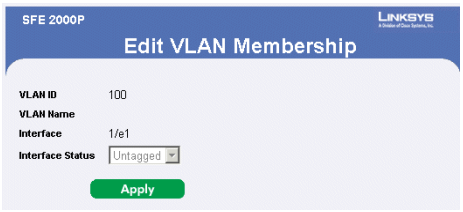
- *Untagged* — Indicates the interface is an untagged VLAN member. Packets forwarded by the interface are untagged.
- *Tagged* — Indicates the interface is a tagged member of a VLAN. All packets forwarded by the interface are tagged. The packets contain VLAN information.
- *Exclude* — Excludes the interface from the VLAN. However, the interface can be added to the VLAN through GARP.
- *Forbidden* — Denies the interface VLAN membership, even if GARP indicates the port is to be added.

2. Define the relevant fields.
3. Click **Apply**. VLAN membership is defined, and the device is updated.

*Modifying VLAN Membership*

1. Click **Bridging** > **VLAN Management** > **Membership**. The *VLAN Membership Page* opens:
2. Click the **Edit** button. The *Edit VLAN Membership Page* opens:

***Edit VLAN Membership Page***




The *Edit VLAN Membership Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **VLAN Name** — Displays the VLAN name.
- **Interface** — Displays the port or LAG attached to the VLAN.
- **Interface Status** — Displays the current interface status.

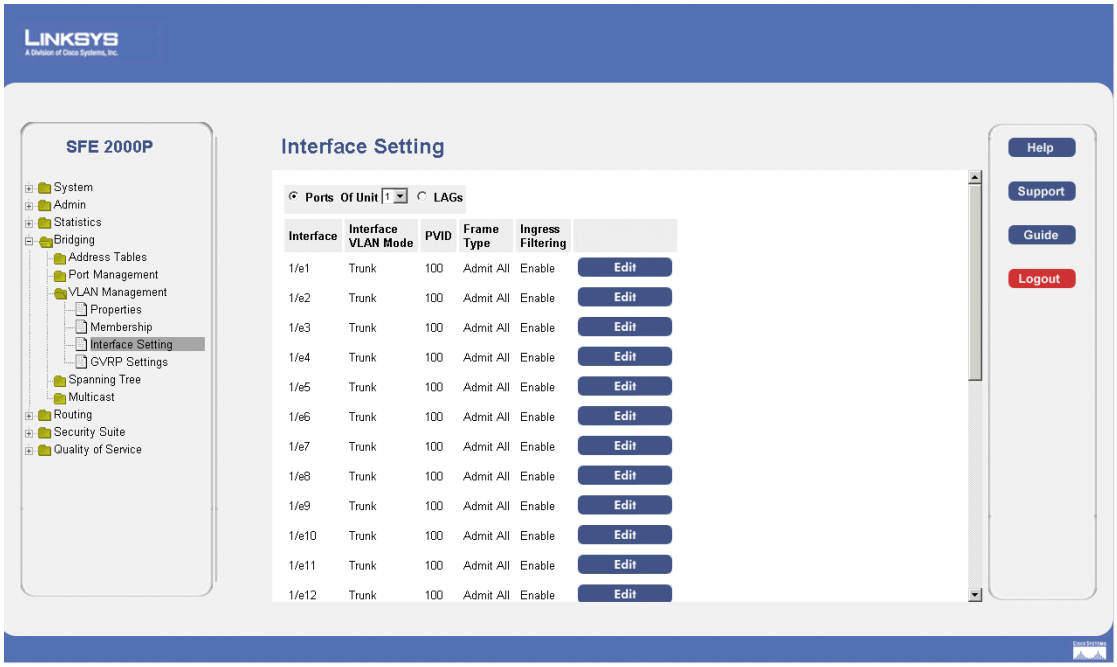
3. Define the relevant fields.
4. Click **Apply.** VLAN Membership is modified, and the device is updated.

# Defining Interface Settings

The VLAN *Interface Setting Page* provides parameters for managing ports that are part of a VLAN. The port default VLAN ID (PVID) is configured on the VLAN *Port Settings* page. All untagged packets arriving to the device are tagged by the ports PVID.

1. Click **Bridging** > **VLAN Management** > **Interface Setting**. The VLAN *Interface Setting Page* opens:

***Interface Setting Page***




The VLAN *Interface Setting Page* contains the following fields:

- **Port** — Indicates that ports are indicated in the page.
- **LAG** — Indicates that LAGs are indicated in the page.
- **Of Unit** — Displays the stacking member for which the VLAN parameters are displayed.
- **Interface** — The port number included in the VLAN.
- **Interface VLAN Mode** — Indicates the port mode. Possible values are:
  - *General* — The port belongs to VLANs, and each VLAN is user-defined as tagged or untagged (full 802.1Q mode).
  - *Access* — The port belongs to a single untagged VLAN. When a port is in Access mode, the packet types which are accepted on the port (packet type) cannot be designated. It is also not possible to enable/disable ingress filtering on an access port.

– *Trunk* — The port belongs to VLANs in which all ports are tagged (except for an optional single native VLAN).

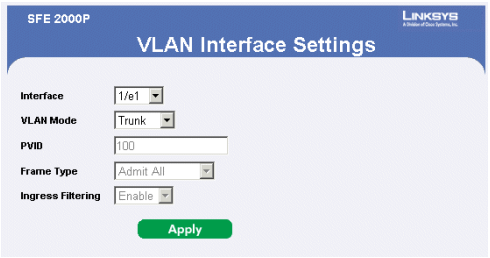
- **PVID** — Assigns a VLAN ID to untagged packets. The possible values are 2 to 4094. VLAN 4095 is defined as per standard and industry practice as the discard VLAN. Packets classified to the Discard VLAN are dropped.
- **Frame Type** — Packet type accepted on the port. Possible values are:
  – *Admit Tag Only* — Indicates that only tagged packets are accepted on the port.
  – *Admit All* — Indicates that both tagged and untagged packets are accepted on the port.
- **Ingress Filtering** — Enables or disables Ingress filtering on the port. Ingress filtering discards packets which do not include an ingress port.

2. Define the relevant fields.
3. Click **Apply**. The VLAN Interface Settings are defined, and the device is updated.

*Modifying VLAN Interface Settings*

1. Click **Bridging** > **VLAN Management** > **Interface Setting**. The VLAN *Interface Setting Page* opens:
2. Click the **Edit** button. The *VLAN Interface Settings Page* opens:

***VLAN Interface Settings Page***




The *VLAN Interface Settings Page* contains the following fields:

- **Interface** — The port number included in the VLAN.
- **VLAN Mode** — Indicates the port mode. Possible values are:
  – *General* — The port belongs to VLANs, and each VLAN is user-defined as tagged or untagged (full 802.1Q mode).
  – *Access* — The port belongs to a single untagged VLAN. When a port is in Access mode, the packet types which are accepted on the port (packet type) cannot be designated. It is also not possible to enable/disable ingress filtering on an access port.
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- **Frame Type** — Packet type accepted on the port. Possible values are:
  - *Admit Tag Only* — Indicates that only tagged packets are accepted on the port.
  - *Admit All* — Indicates that both tagged and untagged packets are accepted on the port.
- **Ingress Filtering** — Enables or disables Ingress filtering on the port. Ingress filtering discards packets which do not include an ingress port.

3. Define the relevant fields.
4. Click **Apply**. The VLAN Interface settings are modified, and the device is updated.

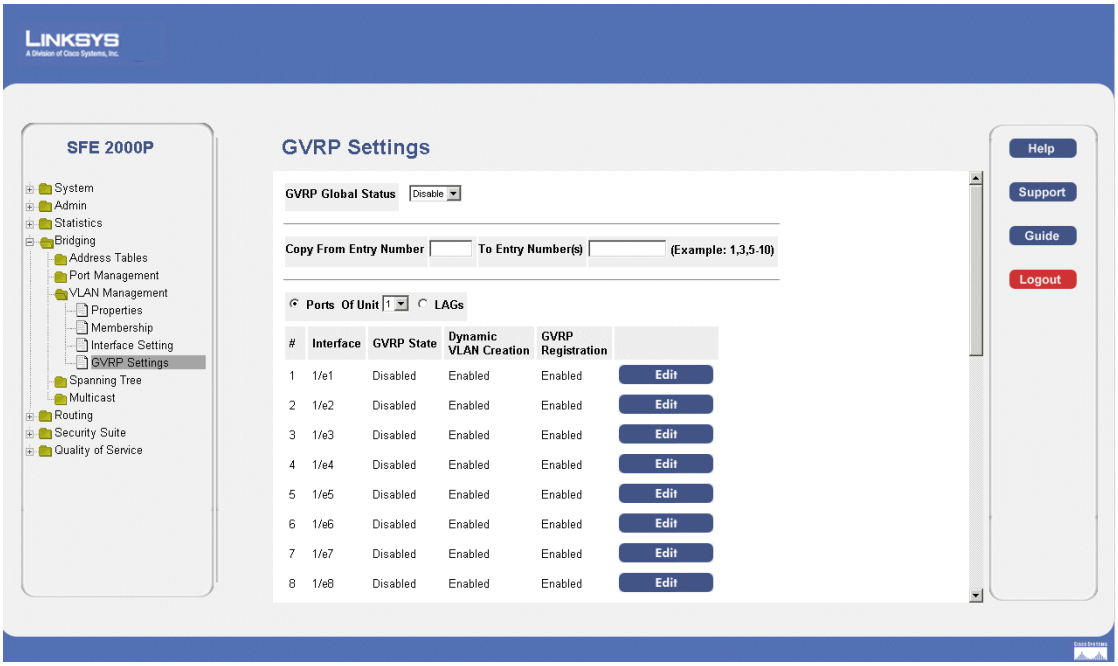
# Configuring GVRP Settings

GARP VLAN Registration Protocol (GVRP) is specifically provided for automatic distribution of VLAN membership information among VLAN-aware bridges. GVRP allows VLAN-aware bridges to automatically learn VLANs to bridge ports mapping, without having to individually configure each bridge and register VLAN membership. To define GARP.

The Global System LAG information displays the same field information as the ports, but represent the LAG GVRP information.

1. Click **Bridging** > **VLAN Management** > **GVRP Settings**. The *GVRP Settings Page* opens:

***GVRP Settings Page***




The *GVRP Settings Page* contains the following fields:

- **GVRP Global Status** — Indicates if GVRP is enabled on the device. The possible field values are:
  - *Enable* — Enables GVRP on the selected device.
  - *Disable* — Disables GVRP on the selected device.
- **Copy from Entry Number** — Indicates the row number from which GVRP parameters are copied.
- **To Entry Number** — Indicates the row number to which GVRP parameters are copied
- **Port** — Indicates the port number on which GVRP is enabled.
- **LAGs** — Indicates the LAG number on which GVRP is enabled.
- **Of Unit** — Displays the stacking member for which the GVRP parameters are displayed.

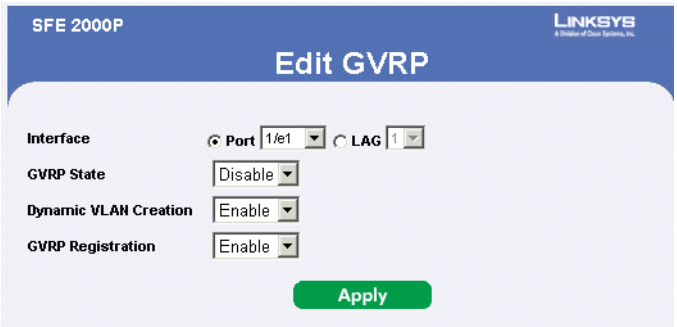
- **Interface** — Displays the interface on which GVRP is enabled.
- **GVRP State** — Indicates if GVRP is enabled on the interface. The possible field values are:
  - *Enabled* — Enables GVRP on the selected interface.
  - *Disable*d — Disables GVRP on the selected interface.
- **Dynamic VLAN Creation** — Indicates if Dynamic VLAN creation is enabled on the interface. The possible field values are:
  - *Enable* — Enables Dynamic VLAN creation on the interface.
  - *Disable* — Disables Dynamic VLAN creation on the interface.
- **GVRP Registration** — Indicates if VLAN registration through GVRP is enabled on the device. The possible field values are:
  - *Enable* — Enables GVRP registration on the device.
  - *Disable* — Disables GVRP registration on the device.

2. Define the relevant fields.
3. Click Apply. The GVRP Settings are defined, and the device is updated.

*Modifying GVRP Settings*

1. Click **Bridging** > **VLAN Management** > **GVRP Settings**. The *GVRP Settings Page* opens:
2. Click the **Edit** button. The *Edit GVRP Page* opens:

***Edit GVRP Page***




The *Edit GVRP Page* contains the following fields:

- **Interface** — Displays the interface on which GVRP is enabled. The possible field values are:
  - *Port* — Indicates the port number on which GVRP is enabled.
  - *LAG* — Indicates the LAG number on which GVRP is enabled.
- **GVRP State** — Indicates if GVRP is enabled on the interface. The possible field values are:

  - *Enabled* — Enables GVRP on the selected interface.
  - *Disable*d — Disables GVRP on the selected interface.

- **Dynamic VLAN Creation** — Indicates if Dynamic VLAN creation is enabled on the interface. The possible field values are:
  - *Enable* — Enables Dynamic VLAN creation on the interface.
  - *Disable* — Disables Dynamic VLAN creation on the interface.
- **GVRP Registration** — Indicates if VLAN registration through GVRP is enabled on the device. The possible field values are:
  - *Enable* — Enables GVRP registration on the device.
  - *Disable* — Disables GVRP registration on the device.

3. Define the relevant fields.
4. Click **Apply**. GVRP settings are modified, and the device is updated.

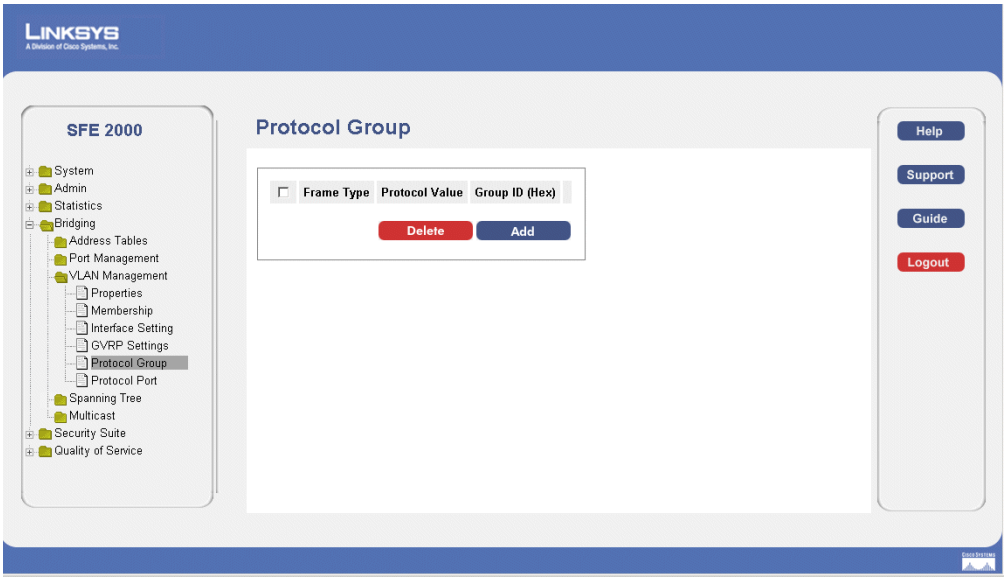
# Protocol Group

The *Protocol Group Page* contains information defining protocol names and the VLAN Ethernet type. Interfaces can be classified as a specific protocol based interface.

**NOTE:** This setting is relevant only in Layer 2 mode.

1. Click **Bridging > VLAN Management** > **Protocol Group**. The *Protocol Group Page* opens:

***Protocol Group Page***

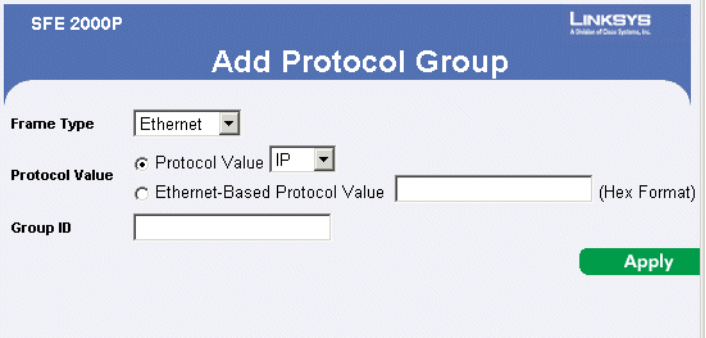



The *Protocol Group Page* contains the following fields:

- **Frame Type** — Displays the packet type. Possible field values are Ethernet, RFC1042, and LLC Other.
- **Protocol Value —** Displays the User-defined protocol name.
- **Group ID (Hex) —** Defines the Protocol group ID to which the interface is added. Range is 1-2147483647.

2. Click the **Add** Button. The *Add Protocol Group Page* opens:

***Add Protocol Group Page***




The *Add Protocol Group Page* provides information for configuring new VLAN protocol groups. The *Add Protocol Group Page* contains the following fields.

- **Frame Type** — Displays the packet type. Possible field values are Ethernet, RFC1042, and LLC Other.
- **Protocol Value —** Displays the User-defined protocol value. The options are as follows:
  - *Protocol Value* — The value is entered in Hex format.
  - *Ethernet-Based Protocol Value* — The value is selected as either IP, IPX, IPv6., or ARP
- **Group ID (Hex)—** Defines the Protocol group ID to which the interface is added.

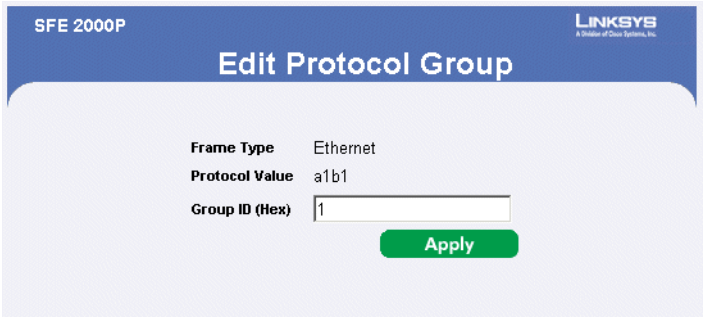
3. Define the relevant fields.
4. Click **Apply**. The Protocol Group is added, and the device is updated.

*Modifying Protocol Groups*

The *Edit Protocol Group Page* provides information for configuring new VLAN protocol groups

1. Click **Bridging > VLAN Management** > **Protocol Group**. The *Protocol Group Page* opens:
2. Click the **Edit** Button. The Edit Protocol Group Page opens:

***Edit Protocol Group Page***




The *Edit Protocol Group Page* contains the following fields.

- **Frame Type** — Displays the packet type. Possible field values are Ethernet, RFC1042, and LLC Other.
- **Protocol Value** — Displays the User-defined protocol value.
- **Group ID (Hex)** — Defines the Protocol group ID to which the interface is added.

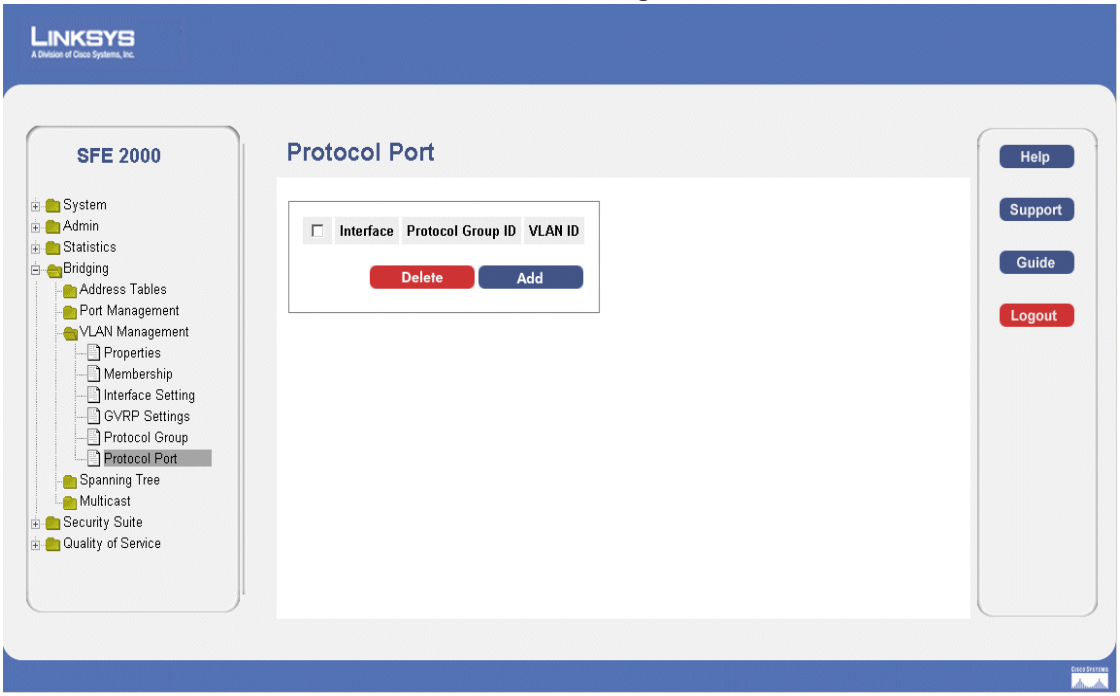
3. Define the relevant fields.
4. Click **Apply**. The Protocol group is modified, and the device is updated.

# Protocol Port

The *Protocol Port Page* adds interfaces to Protocol groups. To define the protocol port:

1. Click **Bridging > VLAN Management** > **Protocol Port**. The *Protocol Port Page* opens:

***Protocol Port Page***



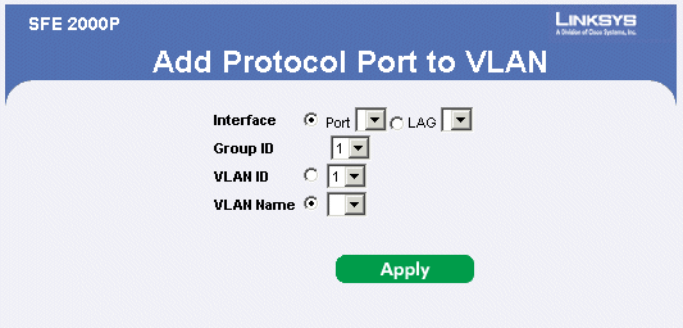

The *Protocol Port Page* contains the following fields.

- **Interface** — Port or LAG number added to a protocol group.
- **Protocol Group ID** — Protocol group ID to which the interface is added. Protocol group IDs are defined in the Protocol Group Table.
- **VLAN ID** — Attaches the interface to a user-defined VLAN ID. Protocol ports can either be attached to a VLAN ID or a VLAN name.

2. Click the **Add** Button. The *Add Protocol Port to VLAN Page* opens:

The *Add Protocol Port to VLAN Page* provides information for editing protocol port configurations.

***Add Protocol Port to VLAN Page***




The *Add Protocol Port to VLAN Page* contains the following fields.

- **Interface** — Port or LAG number added to a protocol group.
- **Group ID** — Protocol group ID to which the interface is added. Protocol group IDs are defined in the Protocol Group Table.
- **VLAN ID** — Attaches the interface to a user-defined VLAN ID.
- **VLAN Name** — Attaches the interface to a user-defined VLAN Name.

3. Define the relevant fields.
4. Click **Apply**. The protocol ports are mapped to VLANs, and the device is updated.

# Configuring IP Information

This section provides information for defining device IP addresses, and includes the following topics:

- Domain Name System
- Configuring Layer 2
- Configuring Layer 3

# Domain Name System

*Domain Name System* (DNS) converts user-defined domain names into IP addresses. Each time a domain name is assigned, the DNS service translates the name into a numeric IP address. For example, **www.ipexample.com** is translated into 192.87.56.2. DNS servers maintain databases of domain names and their corresponding IP addresses. The Domain Name System contains the following windows:

- Defining DNS Server
- Host Mapping

## Defining DNS Server

The *DNS Servers Page* contains fields for enabling and activating specific DNS servers. To enable a DNS client:

1. Click **System** > **System Management** > **Domain Name System** > **DNS Servers**. The *DNS Servers Page* opens:

***DNS Servers Page***

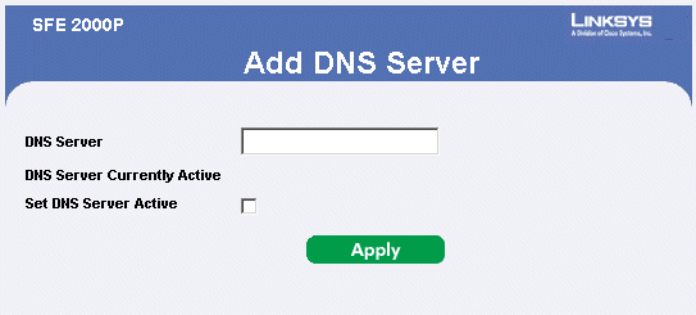
The *DNS Servers Page* contains the following fields.

- **Enable DNS** — Enables translating the DNS names into IP addresses. The possible field values are:
  - *Checked* — Translates the domains into IP addresses.
  - *Unchecked* — Disables translating domains into IP addresses.
- **Default Domain Name** (1 -158 Characters) — Specifies the user-defined DNS server name.

- **Type** — Displays the IP address type. The possible field values are:
  - *Dynamic* — The IP address is dynamically created.
  - *Static* — The IP address is a static IP address.
- **Remove** — Removes DNS servers. The possible field values are:
  - *Checked* — Removes the selected DNS server
  - *Unchecked* — Maintains the current DNS server list.
- **DNS Server** — Displays the DNS server's IP address.
- **Active Server**— Specifies the DNS server that is currently active.

2. Click the **Add** button. The *Add DNS Server Page* opens:

***Add DNS Server Page***




The *Add DNS Server Page* allows system administrators to define new DNS servers. The Add DNS Server Page page contains the following fields.

- **DNS Server** — Displays the DNS server's IP address.
- **DNS Server Currently Active** — Displays the DNS server which is currently active.
- **Set DNS Server Active** — Indicates the DNS to be server activated.

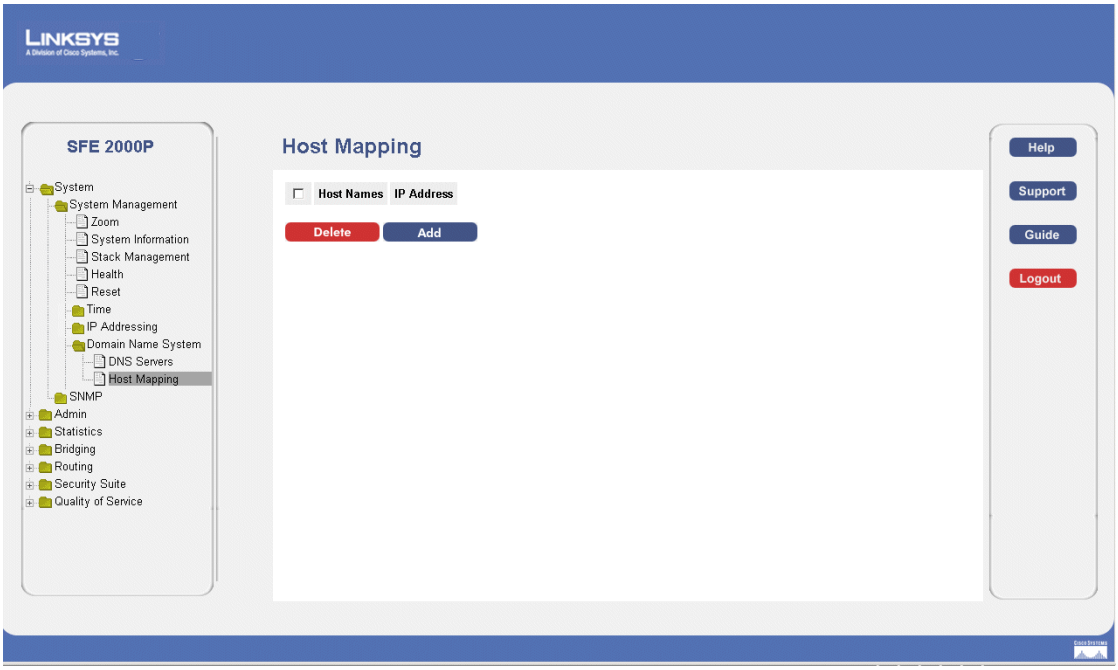
3. Define the relevant fields.
4. Click **Apply.** The DNS server is added, and the device is updated.

## Host Mapping

The *Host Mapping Page* provides information for defining DNS Host Mapping. The *DNS* Host Mapping Page page contains the following fields.

1. Click **System** > **System Management** > **Domain Name System** > **Host Mapping**. The *Host Mapping Page* opens:

***Host Mapping Page***



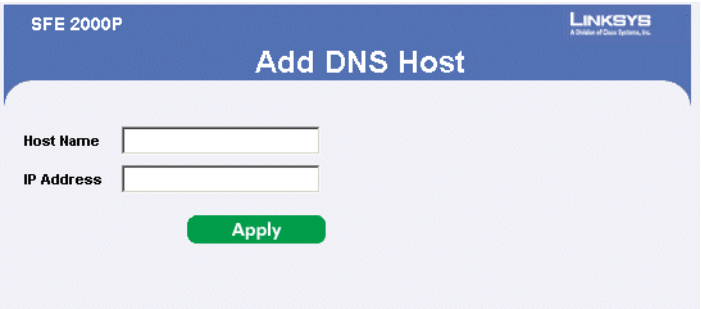

The *Host Mapping Page* contains the following fields:

- **Host Names** — Displays a user-defined default domain name. When defined, the default domain name is applied to all unqualified host names. The *Host Name* field can contain up to 158 characters.
- **IP Address** — Displays the DNS host IP address.

2. Click the **Add** button. The *Add DNS Host Page opens:*

The *Add DNS Host Page* provides information for defining DNS Host Mapping.

***Add DNS Host Page***




The *Add DNS Host* page contains the following fields:

- **Host Name** — Displays a user-defined default domain name. When defined, the default domain name is applied to all unqualified host names. The *Host Name* field can contain up to 158 characters.
- **IP Address** — Displays the DNS host IP address.

3. Define the relevant fields.
4. Click **Apply**. The DNS Host settings are defined, and the device is updated.

# Configuring Layer 2

The IP address and default gateway can be either dynamically or statically configured. In Layer 2, a static IP address is configured on the *VLAN Management Properties Page*. The Management VLAN is set to VLAN 100 by default, but can be modified.

When the system is in stacking mode with a Backup Master present, configure the IP address as a static address. This prevents disconnecting from the network during a Stacking Master switchover.

This section provides information for configuring Layer 2 features, and includes the following topics:

- Configuring IP Addressing
- Defining IP Routing

## Configuring IP Addressing:

The IP Addressing subsection contains the following pages:

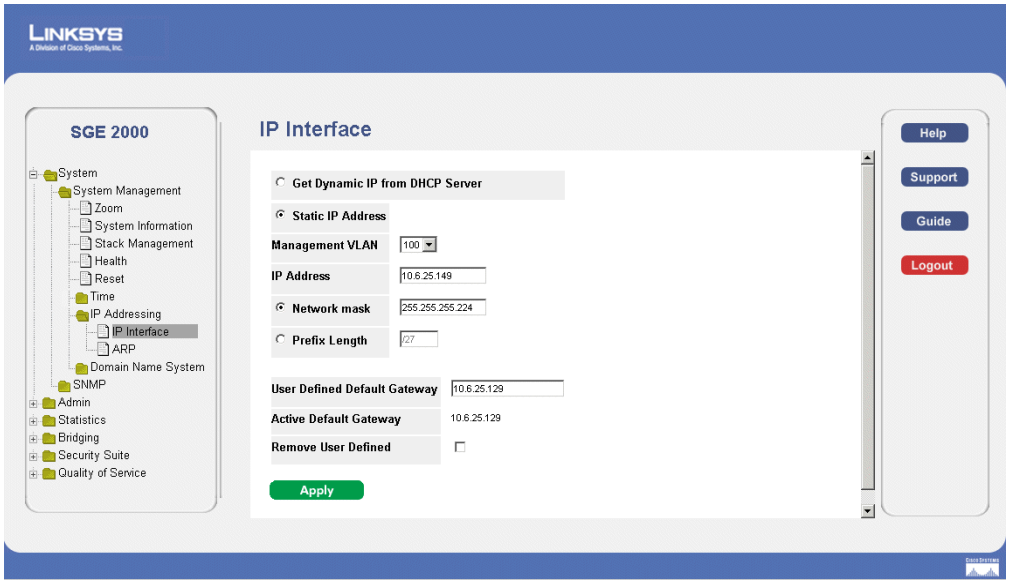
- IP Interface
- ARP

### IP Interface

The *IP Interface Page* contains fields for assigning IP addresses. Packets are forwarded to the default IP when frames are sent to a remote network. The configured IP address must belong to the same IP address subnet of one of the IP interfaces.

1. Click **System** > **System Management** > **IP Addressing** > **IP Interface**. The *IP Interface Page* opens:

*IP Interface Page*




The *IP Interface Page* contains the following fields:

- **Get Dynamic IP from DHCP Server** — Retrieves the IP addresses using DHCP.
- **Static IP Address** — Displays the currently configured IP address. IP addresses are either configured on the Default VLAN or are user-defined.
- **Management VLAN** — Sets the management VLAN. The switch uses this VLAN to watch for management packets from Telnet and web browser management sessions.
- **IP Address** — Indicates the IP address.
- **Network Mask** — Displays the currently configured IP address mask.
- **Prefix Length** — Specifies the number of bits that comprise the source IP address prefix, or the network source IP address mask.
- **User Defined Default Gateway** — Defines the default gateway IP address.
- **Active Default Gateway** — Indicates if the default gateway is active.
- **Remove User Defined** — Removes the selected IP address from the interface. The possible field values are:
  - *Checked* — Removes the IP address from the interface.
  - *Unchecked* — Maintains the IP address assigned to the Interface.

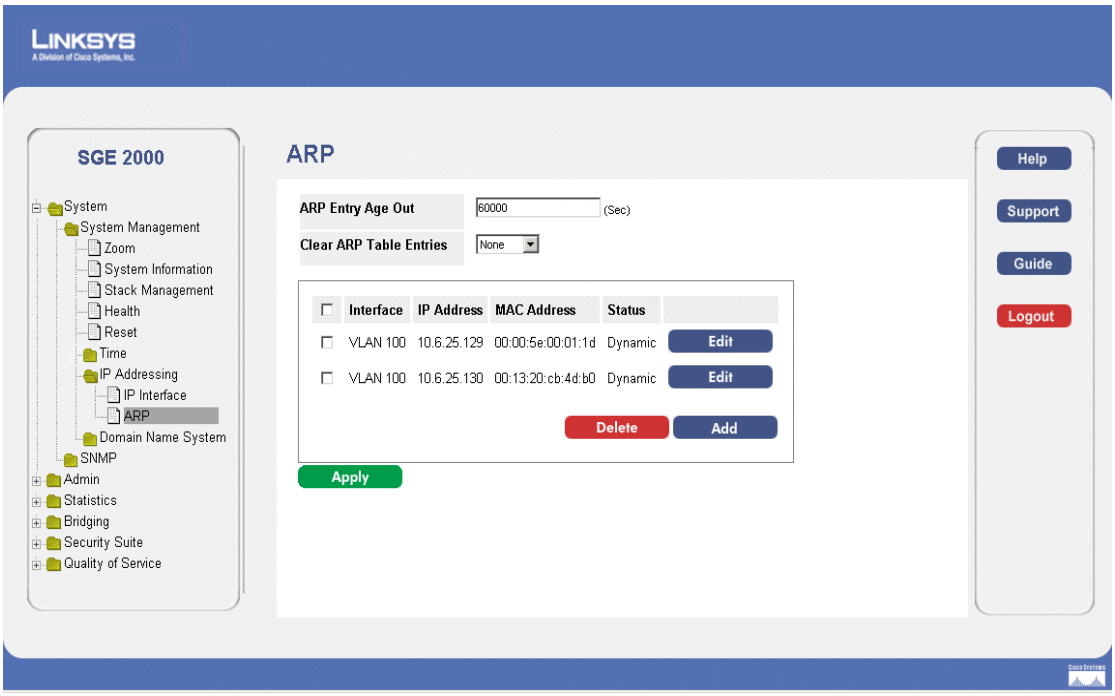
## ARP

The *Address Resolution Protocol* (ARP) is a TCP/IP protocol that converts IP addresses into physical addresses. The ARP table is used to maintain a correlation between each MAC address and its

corresponding IP address. The ARP table can be filled in statically by the user. When a static ARP entry is defined, a permanent entry is put in the table, which the system uses to translate IP addresses to MAC addresses. To define ARP:

1. Click **System** > **System Management** > **IP Addressing** > **ARP**. The *ARP Page* opens:

***ARP Page***



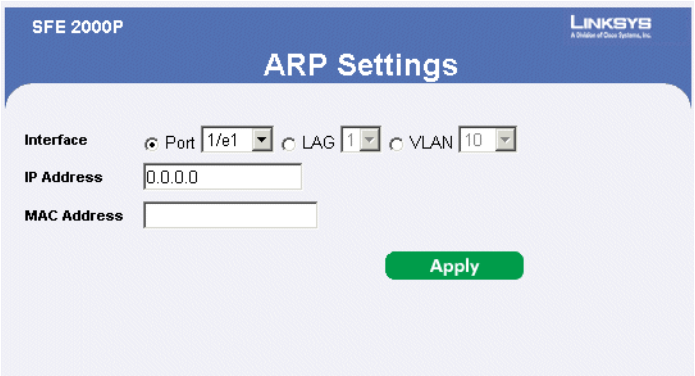

The *ARP Page* contains the following fields.

- **ARP Entry Age Out** — Defines the amount of time (seconds) that pass between ARP requests about an ARP table entry. After this period, the entry is deleted from the table. The range is 1 - 40000000, where zero indicates that entries are never cleared from the cache. The default value is 60,000 seconds.
- **Clear ARP Table Entries**— Indicates the type of ARP entries that are cleared on all devices. The possible values are:
  - *None* — ARP entries are not cleared.
  - *All* — All ARP entries are cleared.
  - *Dynamic* — Only dynamic ARP entries are cleared.
  - *Static* — Only static ARP entries are cleared.
- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.

- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.
- **Status** — Indicates the ARP Table entry status. Possible field values are:
  - *Dynamic* — Indicates the ARP entry was learned dynamically.
  - *Static* — Indicates the ARP entry is a static entry.

2. Click on the **Add ARP** button. The *ARP Settings Page* opens:

***ARP Settings Page***




The *ARP Settings Page* contains the following fields:

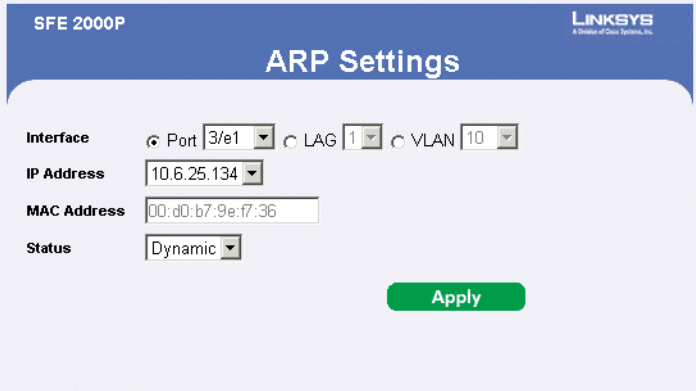
- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.
- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.

3. Define the relevant fields.
4. Click **Apply.** The ARP Settings are defined, and the device is updated.

*Modifying ARP Settings*

1. Click **System** > **System Management** > **IP Addressing** > **ARP**. The *ARP Page* opens:
2. Click the **Edit** button. The *ARP Settings Page* opens:

***ARP Settings Page***




The *ARP Settings Page* contains the following fields:

- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.
- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.
- **Status** — Indicates the ARP Table entry status. Possible field values are:
  - *Dynamic* — Indicates the ARP entry was learned dynamically.
  - *Static* — Indicates the ARP entry is a static entry.

3. Define the relevant fields.
   - Click **Apply.** The ARP Settings are modified, and the device is updated.

# Configuring Layer 3

In Layer 3 mode, multiple IP addresses can be configured on ports, LAGs or VLANS. This provides greater network flexibility than Layer 2 mode where only a single IP address is configured on ports, LAGs or VLANs. A predefined Default Gateway is not provided in Layer 3. To manage the device remotely, a default route is defined. The Default Route is the route with the next hop of 0.0.0.0. The Default Route is defined in the *IP Routing Page*.

This section provides information for configuring Layer 3 features, and includes the following topics:

- Configuring IP Addressing
- Defining IP Routing

## Configuring IP Addressing

The IP Addressing subsection contains the following pages:

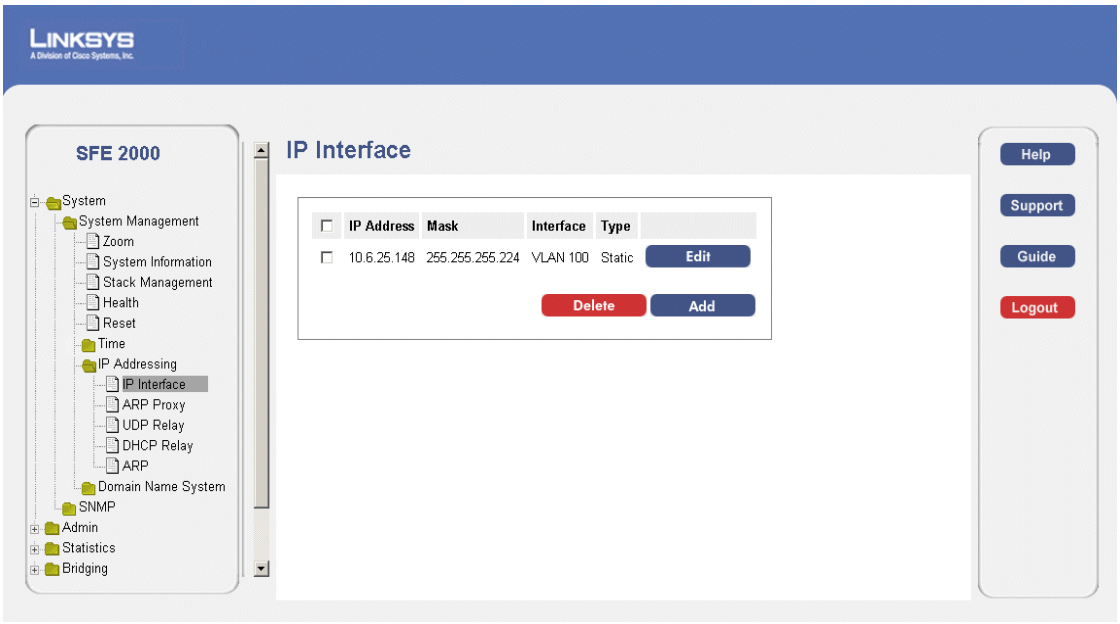
- IP Interface
- ARP Proxy
- UDP Relay
- DHCP Relay
- ARP

### IP Interface

The IP Interface Page contains fields for assigning IP addresses. Packets are forwarded to the default IP when frames are sent to a remote network. The configured IP address must belong to the same IP address subnet of one of the IP interfaces.

1. Click **System** > **System Management** > **IP Addressing** > **IP Interface**. The *IP Interface Page* opens:

***IP Interface Page***




The *IP Interface Page* contains the following fields.

- **IP Address** — Defines the system IP address.
- **Mask** — Displays the currently configured IP address mask.
- **Interface** — Indicates the interface connected to the device.
- **Type** — Indicates if the IP address has been configured statically or added dynamically.
- **Remove** — Removes the selected IP address from the interface. The possible field values are:
  - *Checked* — Removes the IP address from the interface.
  - *Unchecked* — Maintains the IP address assigned to the Interface.

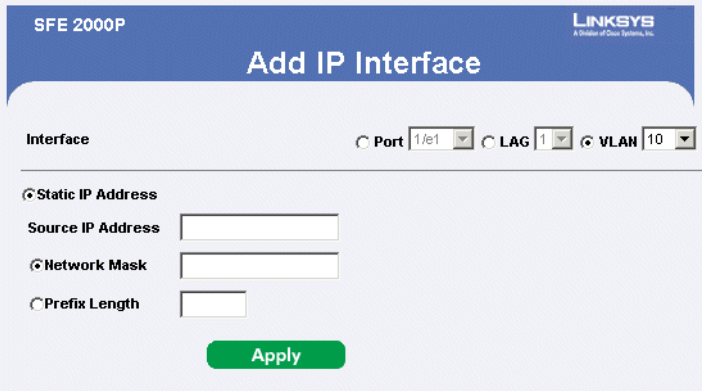
A table containing the IP Interface configurations is displayed containing the following fields:

- **IP Address** — Defines the system IP address.
- **Mask** — Displays the currently configured IP address mask.
- **Interface** — Displays the interface used to manage the device.

2. Click the **Add** button. The *Add IP Interface Page* opens:

The *Add IP Interface Page* allows network managers to create new system IP addresses.

***Add IP Interface Page***



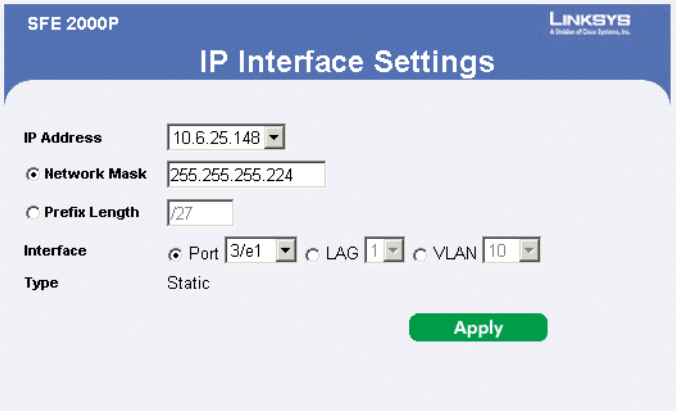

The *Add IP Interface Page* contains the following fields.

- **Interface** — Defines the system IP address.
- **Source IP Address** — Defines the source IP Address.
- **Static IP Address** — Defines the system IP address.
- **Network Mask** — Displays the currently configured IP address mask.
- **Prefix Length** — Specifies the number of bits that comprise the source IP address prefix, or the network source IP address mask.

*Modifying IP Interfaces*

1. Click **System** > **System Management** > **IP Addressing** > **IP Interface**. The *IP Interface Page* opens:
2. Click the **Edit** Button. The *IP Interface Settings Page opens:*

*IP Interface Settings Page*




*IP Interface Settings*

The *IP Interface Settings Page* contains the following fields:

- **IP Address** — Defines the system IP address.
- **Network Mask** — Displays the currently configured IP address mask.
- **Prefix Length** — Specifies the number of bits that comprise the source IP address prefix, or the network source IP address mask
- **Interface** — Defines the system IP address.
- **Type** — Indicates if the IP address has been configured statically or added dynamically.

3. Modify the relevant fields.
4. Click **Update**. The IP Interface Settings are modified, and the device is updated.

## ARP Proxy

The Address Resolution Protocol (ARP) is a TCP/IP protocol that converts IP addresses into physical addresses. The *ARP Proxy Page* allows network managers to enable ARP Proxy on the switch.

1. Click **System** > **System Management** > **IP Addressing** > **ARP Proxy**. The *ARP Proxy Page* opens:

*ARP Proxy Page*

The *ARP Proxy Page* contains the following field.

- **ARP Proxy** — Enables the device to respond to ARP requests for located nodes. If disabled, the device responds with its own MAC address.

2. Enable ARP Proxy.

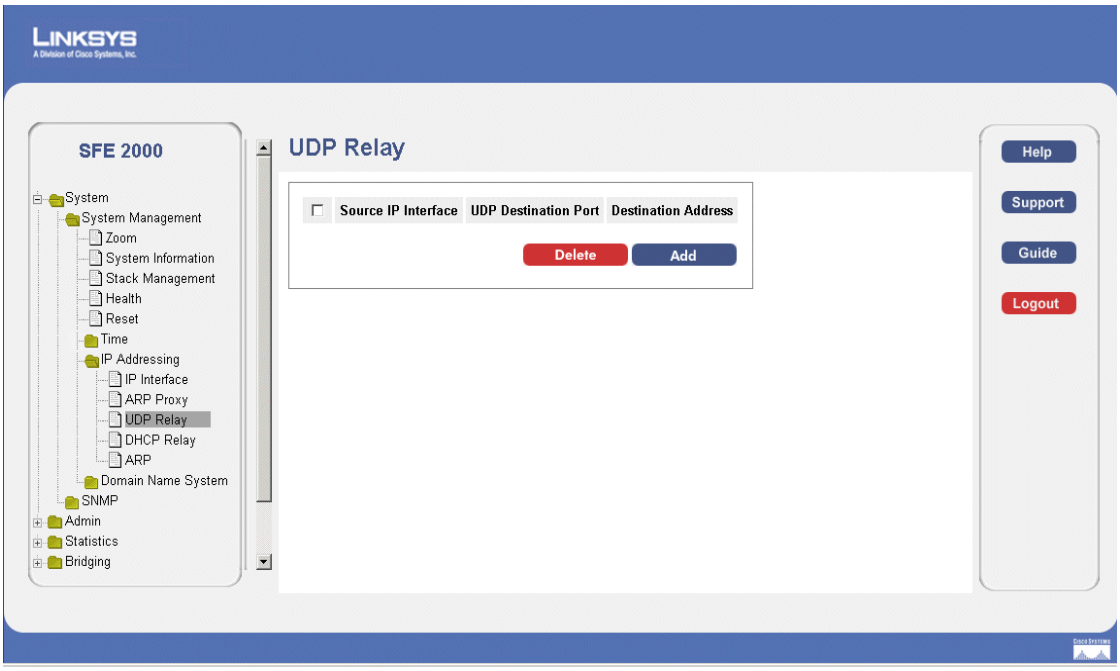
3. Click **Apply**. Arp Proxy is enabled, and the device is updated.

## UDP Relay

The UDP Relay allows UDP packets to reach other networks. This feature enables browsing from workstations to servers on different networks. The *UDP Relay Page* contains the following fields.

1. Click **System** > **System Management** > **IP Addressing** > **UDP Relay**. The *UDP Relay Page* opens:

***UDP Relay Page***




The *UDP Relay Page* contains the following fields:

- **Source IP Interface** — Indicates the input IP interface that relays UDP packets. If this field is 255.255.255.255, UDP packets from all interfaces are relayed. The following address ranges are
  - 0.0.0.0 to 0.255.255.255.
  - 127.0.0.0 to 127.255.255.255.
- **UDP Destination Port**— Indicate the destination UDP port ID number of the relayed UDP packets. The following table lists UDP Port allocations.

**UDP Port Number**

| UDP Port Number | Acronym | Application |
|---|---|---|
| 7 | Echo | Echo |
| 11 | SysStat | Active User |
| 15 | NetStat | Netstat |
| 17 | Quote | Quote of the day |
| 19 | CHARGEN | Character Generator |
| 20 | FTP-data | FTP Data |
| 21 | FTP | FTP |
| 37 | Time | Time |
| 42 | NAMESERVE | Host Name Server |

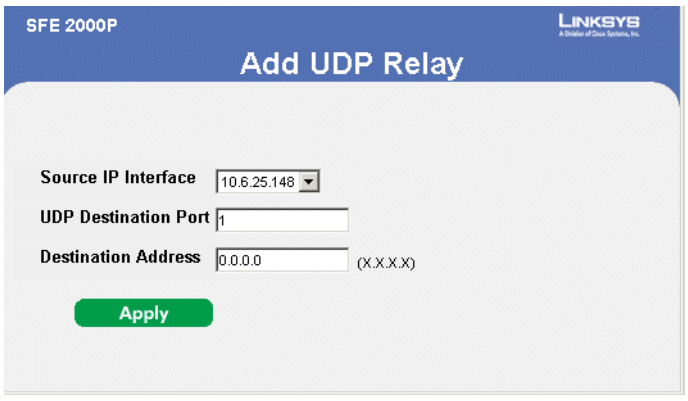
**UDP Port Number**

| UDP Port Number | Acronym | Application |
|---|---|---|
| 43 | NICNAME | Who is |
| 53 | DOMAIN | Domain Name Serve |
| 69 | FTP | Trivial File Transfer |
| 111 | SUNRPC | Sun Microsystems Rpc |
| 123 | NTP | Network Time |
| 123 | NTP | Network Tim |
| 137 | NetBiosNameService | NT Server to StationConnections |
| 138 | NetBiosDatagramService | NT Server to StationConnections |
| 139 | NetBios SessionServiceNT | Server to Station Connections |
| 161 | SNMP | Simple Network Management |
| 162 | SNMP-trap | Simple Network Management Traps |
| 513 | who | Unix Rwho Daemon |
| 525 | timed | Time Daemon |
| 514 | syslog | System Log |

- **Destination Address**— The IP interface that receives UDP packet relays. If this field is 0.0.0.0, UDP packets are discarded. If this field is 255.255.255.255, UDP packets are flooded to all IP interfaces.

2. Click the **Add** button. The *Add UDP Relay Page* opens:

***Add UDP Relay Page***




The *Add UDP Relay Page* contains the following fields:

- **Source IP Interface** — Indicates the input IP interface that relays UDP packets. If this field is 255.255.255.255, UDP packets from all interfaces are relayed. The following address ranges are

  – 0.0.0.0 to 0.255.255.255.

– 127.0.0.0 to 127.255.255.255.

- **UDP Destination Port**— Indicate the destination UDP port ID number of the relayed UDP packets. The following table lists UDP Port allocations
- **Destination Address**— The IP interface that receives UDP packet relays. If this field is 0.0.0.0, UDP packets are discarded. If this field is 255.255.255.255, UDP packets are flooded to all IP interfaces.

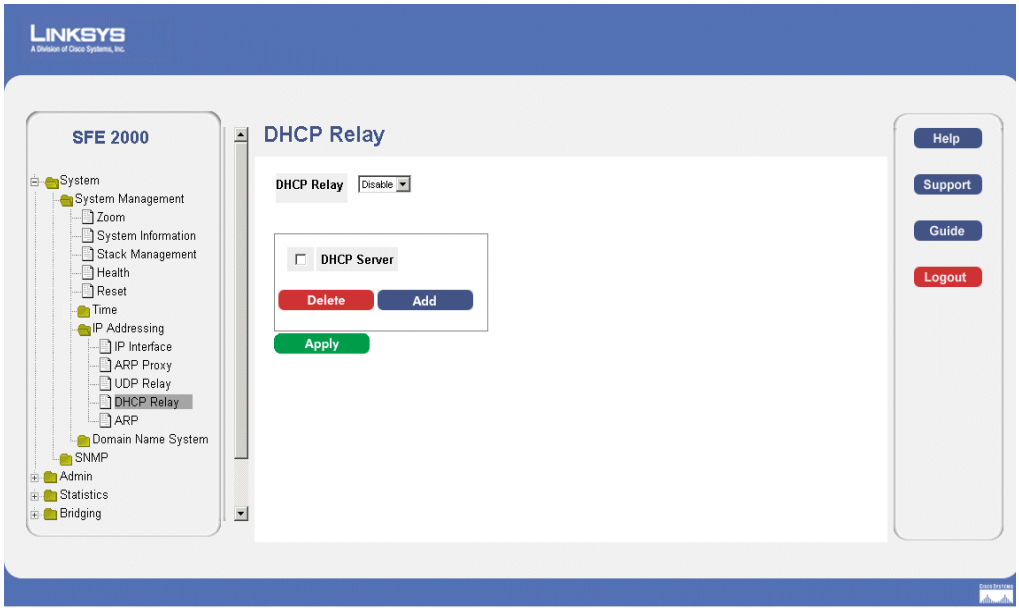
3. Define the relevant fields.
4. Click **Apply**. The UDP Relay Settings are defined, and the device is updated.

## DHCP Relay

The *DHCP Relay Page* provides information for establishing a DHCP configuration with multiple DHCP servers to ensure redundancy. IP Addresses are controlled and distributed one-by-one to avoid overloading the device

1. Click **System** > **System Management** > **IP Addressing** > **DHCP Relay**. The *DHCP Relay Page* opens:

***DHCP Relay Page***

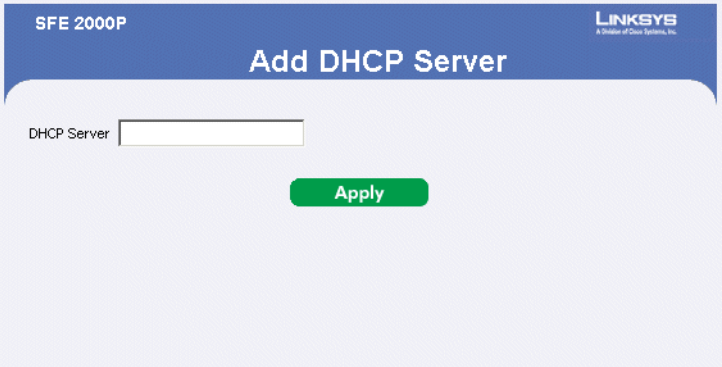



The *DHCP Relay Page* contains the following fields:

- **DHCP Relay**— Enable or Disables DHCP on the device.
- **DHCP Server** — Adds a DHCP Server to the DHCP Relay Table. The DHCP servers act as a DHCP relay if the parameter is not equal to 0.0.0.0. DHCP requests are relayed only if their SEC field is greater or equal to the threshold value. This allows local DHCP Servers to respond first.

2. Click the **Add** button. The *Add DHCP Server Page* opens:

***Add DHCP Server Page***




The *Add DHCP Server Page* contains the following field:

- **DHCP Server** —Adds a DHCP Server to the DHCP Relay Table. The DHCP servers act as a DHCP relay if the parameter is not equal to 0.0.0.0. DHCP requests are relayed only if their SEC field is greater or equal to the threshold value. This allows local DHCP Servers to respond first.

3. Define the relevant field.

4. Click **Apply**. THe DHCP Server is added, and the device is updated.

## ARP

The *Address Resolution Protocol* (ARP) is a TCP/IP protocol that converts IP addresses into physical addresses. The ARP table is used to maintain a correlation between each MAC address and its corresponding IP address. The ARP table can be filled in statically by the user. When a static ARP entry is defined, a permanent entry is put in the table, which the system uses to translate IP addresses to MAC addresses. To define ARP:

1. Click **System** > **System Management** > **IP Addressing** > **ARP**. The *ARP Page* opens:

***ARP Page***

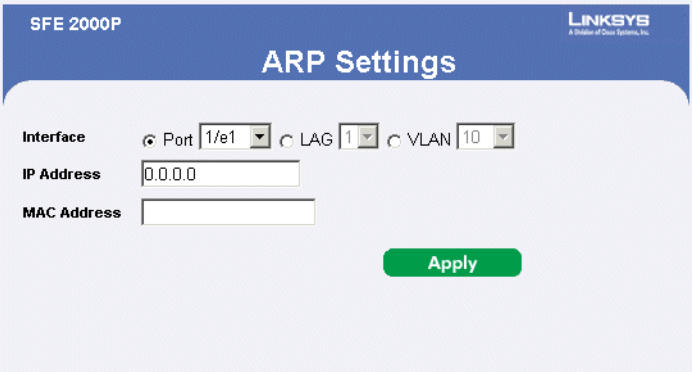
The *ARP Page* contains the following fields.

- **ARP Entry Age Out** — Defines the amount of time (seconds) that pass between ARP requests about an ARP table entry. After this period, the entry is deleted from the table. The range is 1 - 40000000, where zero indicates that entries are never cleared from the cache. The default value is 60,000 seconds.
- **Clear ARP Table Entries**— Indicates the type of ARP entries that are cleared on all devices. The possible values are:
  - *None* — ARP entries are not cleared.
  - *All* — All ARP entries are cleared.
  - *Dynamic* — Only dynamic ARP entries are cleared.
  - *Static* — Only static ARP entries are cleared.
- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.
- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.
- **Status** — Indicates the ARP Table entry status. Possible field values are:
  - *Dynamic* — Indicates the ARP entry was learned dynamically.

– *Static* — Indicates the ARP entry is a static entry.

2. Click on the **Add ARP** button. The *ARP Settings Page* opens:

***ARP Settings Page***




The *ARP Settings Page* contains the following fields:

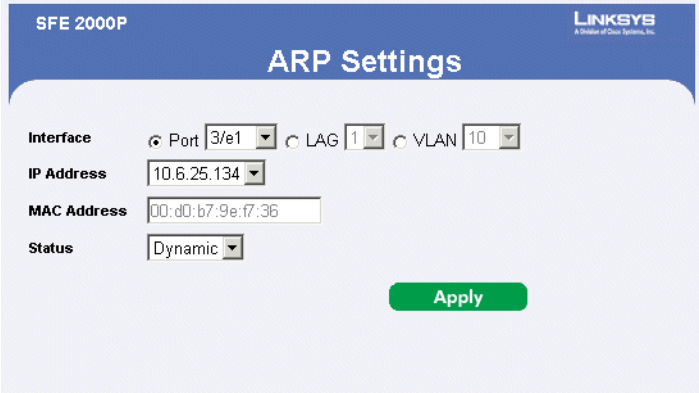
- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.
- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.

3. Define the relevant fields.
4. Click **Apply.** The ARP Settings are defined, and the device is updated.

*Modifying ARP Settings*

1. Click **System** > **System Management** > **IP Addressing** > **ARP**. The *ARP Page* opens:
2. Click the **Edit** button. The *ARP Settings Page* opens:

*ARP Settings Page*




The *ARP Settings Page* contains the following fields:

- **Interface** — Indicates the interface connected to the device.
- **IP Address** — Indicates the station IP address, which is associated with the MAC address filled in below.
- **MAC Address** — Indicates the station MAC address, which is associated in the ARP table with the IP address.
- **Status** — Indicates the ARP Table entry status. Possible field values are:
  - *Dynamic* — Indicates the ARP entry was learned dynamically.
  - *Static* — Indicates the ARP entry is a static entry.

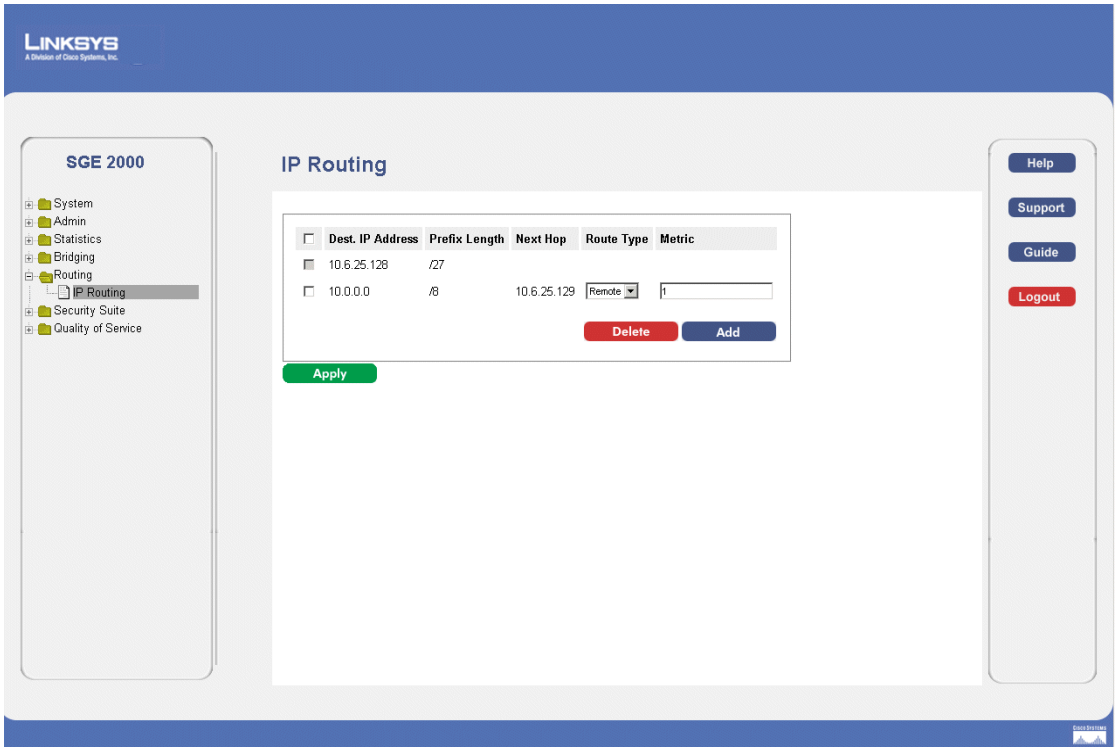
3. Define the relevant fields.
4. Click **Apply.** The ARP Settings are modified, and the device is updated.

## Defining IP Routing

Once the switch has been defined as a router, statics routes can be defined. To define IP Routing:

1. Click **Routing** > **IP Routing**. The *IP Routing Page* opens:

***IP Routing Page***

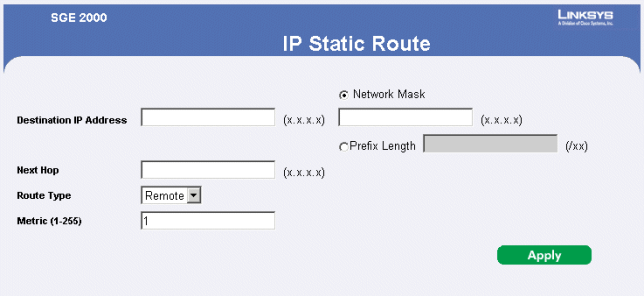



The *IP Routing Page* contains the following fields:

- **Dest. IP Address** — Defines the destination IP address.
- **Prefix Length** —Defines the IP route prefix for the destination IP. The prefix length must be preceded by a forward slash (/).
- **Next Hop** — Indicates the next hop's IP address or IP alias on the route.
- **Route Type** —Defines the route type. The possible field values are:
  - *Reject* — Rejects the route, and stops routing to the destination network via all gateways.
  - *Remote* — Indicates the route is a remote path.
- **Metric** — Indicates the administrative distance to the next hop. The range is 1-255. The default value is 1.

2. Click the **Add** button. The *IP Static Route Page* opens:

***IP Static Route Page***




The *IP Static Route Page* contains the following fields:

- **Destination IP Address** — Defines the destination IP address.
- **Prefix Length** —Defines the IP route prefix for the destination IP. The prefix length must be preceded by a forward slash (/).
- **Next Hop** — Indicates the next hop's IP address or IP alias on the route.
- **Route Type** —Defines the route type. The possible field values are:
  - *Reject* — Rejects the route, and stops routing to the destination network via all gateways.
  - *Remote* — Indicates the route is a remote path.
- **Metric** — Indicates the administrative distance to the next hop. The range is 1-255. The default value is 1.

3. Define the relevant fields.
4. Click **Apply**. The IP Static route is added, and device is updated.

# Defining Address Tables

MAC addresses are stored in either the Static Address or the Dynamic Address databases. A packet addressed to a destination stored in one of the databases is forwarded immediately to the port. The Dynamic Address Table can be sorted by interface, VLAN, and MAC Address. MAC addresses are dynamically learned as packets from sources arrive at the device. Addresses are associated with ports by learning the ports from the frames source address. Frames addressed to a destination MAC address that is not associated with any port, are flooded to all ports of the relevant VLAN. Static addresses are manually configured. In order to prevent the bridging table from overflowing, dynamic MAC addresses, from which no traffic is seen for a certain period, are erased.

This section contains information for defining both static and dynamic Forwarding Database entries, and includes the following topics:

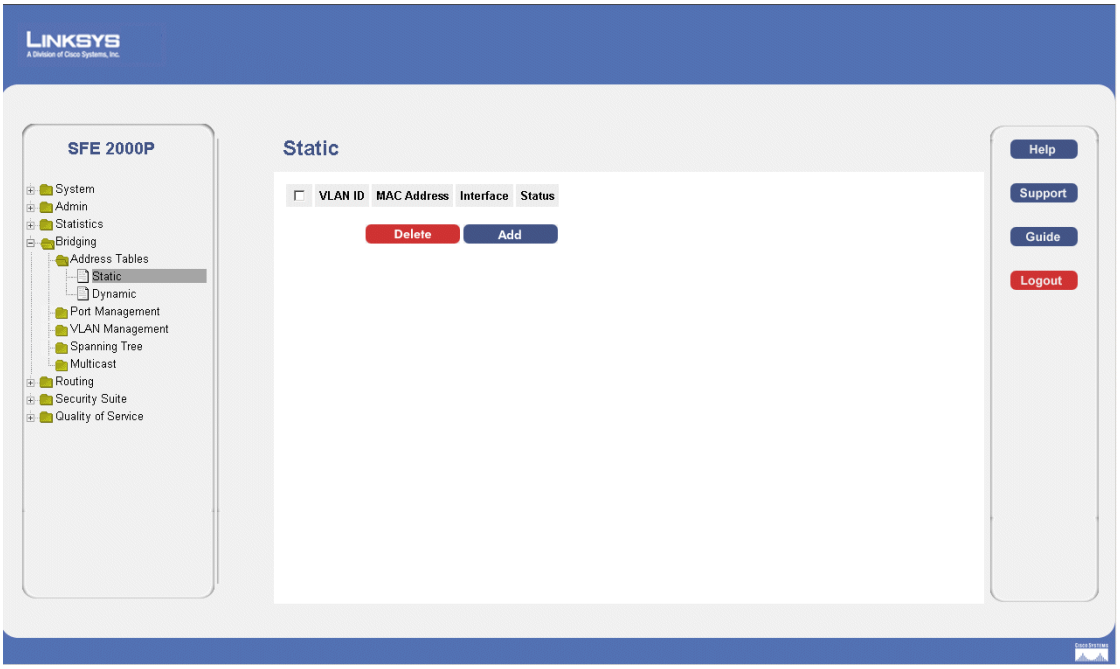
- Defining Static Addresses
- Defining Dynamic Addresses

# Defining Static Addresses

A static address can be assigned to a specific interface on this switch. Static addresses are bound to the assigned interface and cannot be moved. When a static address is seen on another interface, the address will be ignored and will not be written to the address table. To define static addresses:

1. Click **Bridging** > **Address Tables** > **Static**. The *Static Page* opens:

***Static Page***

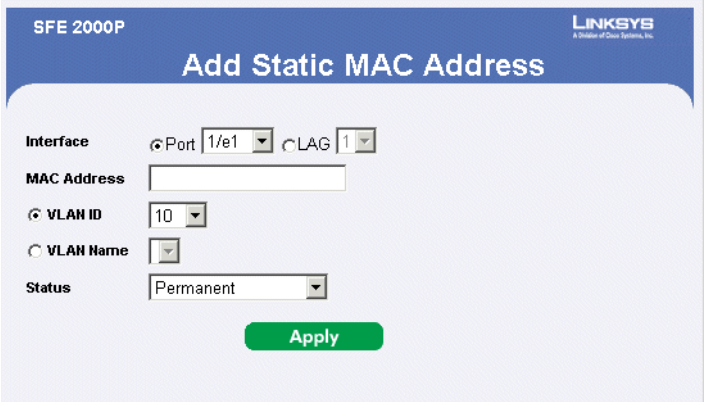



The *Static Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID number to which the entry refers.
- **MAC Address** — Displays the MAC address to which the entry refers.
- **Interface** — Displays the interface to which the entry refers:
  - *Port* — The specific port number to which the forwarding database parameters refer.
  - *LAG* — The specific LAG number to which the forwarding database parameters refer.
- **Status** — Displays how the entry was created. The possible field values are:
  - *Permanent* — The MAC address is permanent.
  - *Delete on Reset* — The MAC address is deleted when the device is reset.
  - *Delete on Timeout* — The MAC address is deleted when a timeout occurs.
  - *Secure* — The MAC Address is defined for locked ports.

2. Click the **Add** button. The *Add Static MAC Address Page* opens:

***Add Static MAC Address Page***




The *Add Static MAC Address Page* contains the following fields:

- **Unit Number** — Indicates the stacking member for which the Static address is defined.
- **Interface** — Displays the interface to which the entry refers:
  - *Port* — The specific port number to which the forwarding database parameters refer.
  - *LAG* — The specific LAG number to which the forwarding database parameters refer.
- **MAC Address** — Displays the MAC address to which the entry refers.
- **VLAN ID** — Displays the VLAN ID number to which the entry refers.
- **VLAN Name** — Displays the VLAN name to which the entry refers.
- **Status** — Displays how the entry was created. The possible field values are:
  - *Permanent* — The MAC address is permanent.
  - *Delete on Reset* — The MAC address is deleted when the device is reset.
  - *Delete on Timeout* — The MAC address is deleted when a timeout occurs.
  - *Secure* — The MAC Address is defined for locked ports.

3. Define the relevant fields.
4. Click **Apply**. The Static MAC Address is added, and the device is updated.

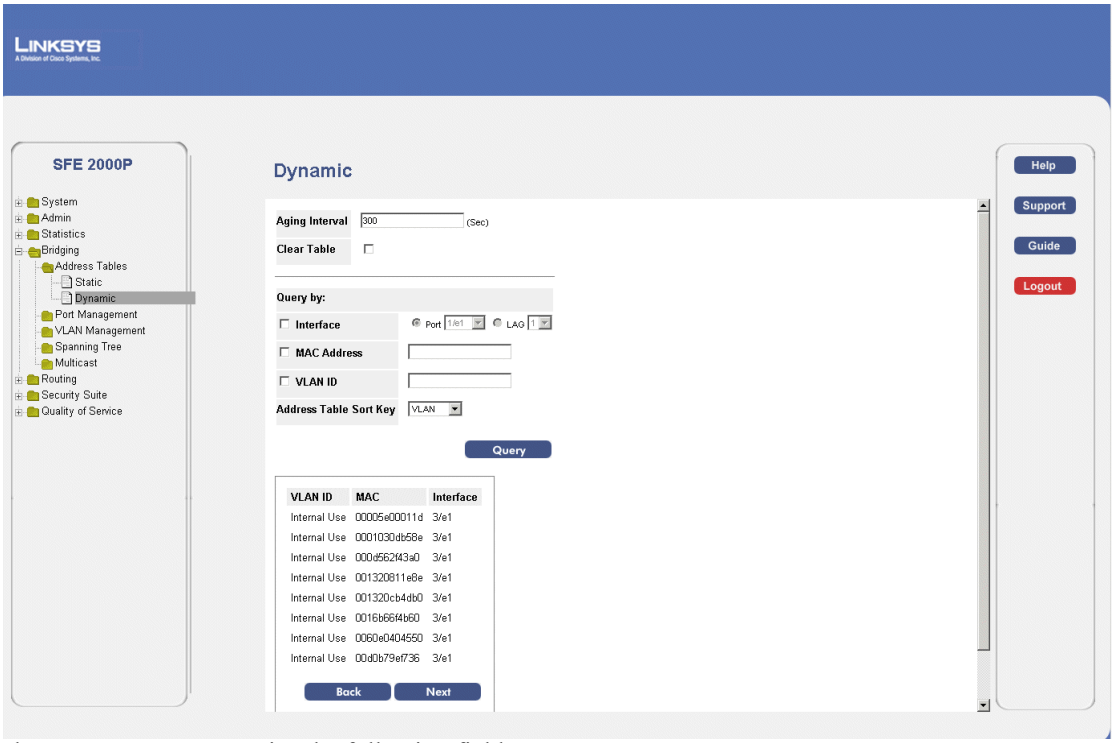
# Defining Dynamic Addresses

The Dynamic Address Table contains the MAC addresses learned by monitoring the source address for traffic entering the switch. When the destination address for inbound traffic is found in the database, the packets intended for that address are forwarded directly to the associated port. Otherwise, the traffic is flooded to all ports.

The *Dynamic Page* contains parameters for querying information in the Dynamic MAC Address Table, including the interface type, MAC addresses, VLAN, and table storing. The Dynamic MAC Address table contains information about the aging time before a dynamic MAC address is erased, and includes parameters for querying and viewing the Dynamic MAC Address table. The Dynamic MAC Address table contains address parameters by which packets are directly forwarded to the ports. The Dynamic Address Table can be sorted by interface, VLAN, and MAC Address.

1. Click **Bridging** > **Address Tables** > **Dynamic**. The *Dynamic Page* opens:

***Dynamic Page***




The *Dynamic Page* contains the following fields:

- **Aging Interval (secs)** — Specifies the amount of time the MAC address remains in the Dynamic MAC Address table before it is timed out, if no traffic from the source is detected. The default value is 300 seconds.
- **Clear Table** — If checked, clears the MAC address table.
- **Interface** — Specifies the interface for which the table is queried. There are two interface types from which to select.

- **MAC Address** — Specifies the MAC address for which the table is queried.
- **VLAN ID** — Specifies the VLAN ID for which the table is queried.
- **Address Table Sort Key** — Specifies the means by which the Dynamic MAC Address Table is sorted. The address table can be sorted by address, VLAN, or interface.

2. Define the relevant fields.
3. Click **Apply**. Dynamic addressing is defined, and the device is updated.

# Configuring Multicast Forwarding

The Multicast section contains the following pages:

- IGMP Snooping
- Defining Multicast Bridging Groups
- Defining Multicast Forwarding

## IGMP Snooping

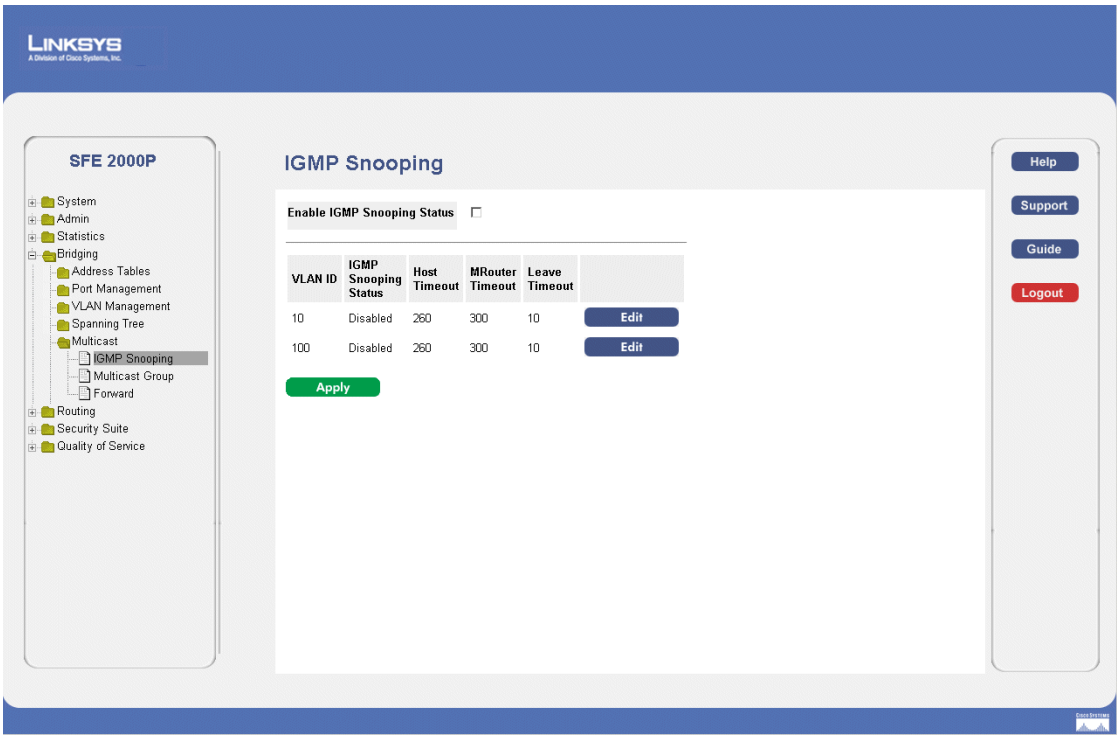
When IGMP Snooping is enabled globally, all IGMP packets are forwarded to the CPU. The CPU analyzes the incoming packets and determines:

- Which ports want to join which Multicast groups.
- Which ports have Multicast routers generating IGMP queries.
- Which routing protocols are forwarding packets and Multicast traffic.

Ports requesting to join a specific Multicast group issue an IGMP report, specifying that Multicast group is accepting members. This results in the creation of the Multicast filtering database. To enable IGMP Snooping:

1. Click **Bridging** > **Multicast** > **IGMP Snooping**. The *IGMP Snooping Page* opens:

*IGMP Snooping Page*




The *IGMP Snooping Page* contains the following fields:

- **Enable IGMP Snooping Status** — Indicates if IGMP Snooping is enabled on the device. IGMP Snooping can be enabled only if Bridge Multicast Filtering is enabled. The possible field values are:
  - *Enable* — Enables IGMP Snooping on the device.
  - *Disable* — Disables IGMP Snooping on the device.
  - **VLAN ID** — Specifies the VLAN ID.
  - **IGMP Snooping Status** — Indicates if IGMP snooping is enabled on the VLAN. The possible field values are:
    - *Enable* — Enables IGMP Snooping on the VLAN.
    - *Disable* — Disables IGMP Snooping on the VLAN.
- **Host Timeout** — Indicates the amount of the time the Host waits to receive a message before it times out. The default value is 260 seconds.
- **MRouter Timeout** — Indicates the amount of the time the Multicast router waits to receive a message before it times out. The default value is 300 seconds.
- **Leave Timeout** — Indicates the amount of time the host waits, after requesting to leave the IGMP group and not receiving a Join message from another station, before timing out. If a Leave Timeout

occurs, the switch notifies the Multicast device to stop sending traffic The Leave Timeout value is either user-defined, or an immediate leave value. The default timeout is 10 seconds.

2. Define the relevant fields.
3. Click **Apply**. The IGMP Global Parameters are updated, and the device is updated.

*Modifying IGMP Snooping*

1. Click **Bridging** > **Multicast** > **ICMP Snooping**. The *IGMP Snooping Page* opens:
2. Click the **Edit** button. The *Edit IGMP Snooping Page*:

***Edit IGMP Snooping Page***

The *Edit IGMP Snooping Page* contains the following fields:

- **VLAN ID** — Specifies the VLAN ID.
- **IGMP Status Enable** — Indicates if IGMP snooping is enabled on the VLAN. The possible field values are:
  - *Enable* — Enables IGMP Snooping on the VLAN.
  - *Disable* — Disables IGMP Snooping on the VLAN.
- **Auto Learn** — Indicates if Auto Learn is enabled on the device. If Auto Learn is enabled, the devices automatically learns where other Multicast groups are located. Enables or disables Auto Learn on the Ethernet device.The possible field values are:
  - *Enable* — Enables auto learn
  - *Disable* — Disables auto learn.
  - **Host Timeout** — Indicates the amount of time host waits to receive a message before timing out. The default time is 260 seconds.
  - **MRouter Timeout** — Indicates the amount of the time the Multicast router waits to receive a message before it times out. The default value is 300 seconds.

- **Leave Timeout** — Indicates the amount of time the host waits, after requesting to leave the IGMP group and not receiving a Join message from another station, before timing out. If a Leave Timeout occurs, the switch notifies the Multicast device to stop sending traffic The Leave Timeout value is either user-defined, or an immediate leave value. The default timeout is 10 seconds.

3. Define the relevant fields.

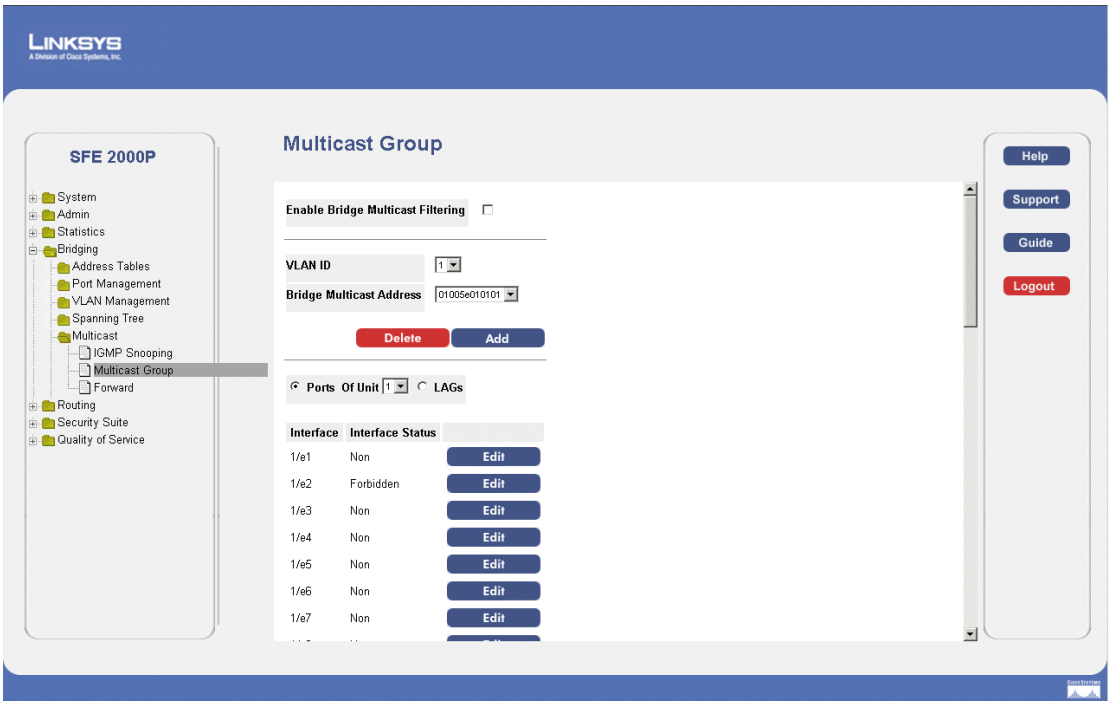
4. Click **Apply**. The IGMP Global Parameters are modified, and the device is updated.

## Defining Multicast Bridging Groups

The *Multicast Group* page displays the ports and LAGs attached to the Multicast service group in the Ports and LAGs tables. The Port and LAG tables also reflect the manner in which the port or LAGs joined the Multicast group. Ports can be added either to existing groups or to new Multicast service groups. The *Multicast Group Page* permits new Multicast service groups to be created. The *Multicast Group Page* also assigns ports to a specific Multicast service address group. To define Multicast groups:

1. Click **Bridging > Bridge Multicast> Multicast Groups**. The *Multicast Group Page* opens:

***Multicast Group Page***




The *Multicast Group Page* contains the following fields:

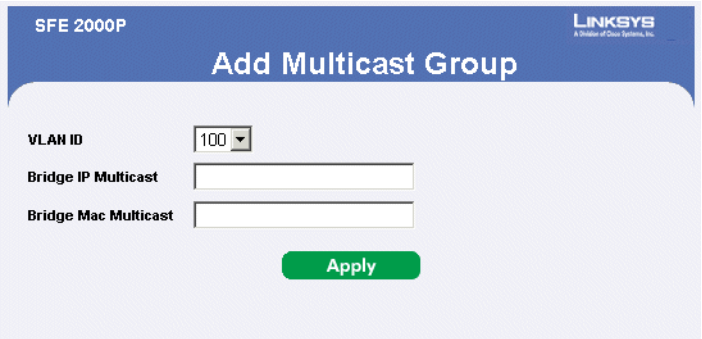
- **Enable Bridge Multicast Filtering** — Indicates if Bridge Multicast Filtering is enabled on the device. Bridge Multicast Filtering can be enabled only if Bridge Multicast Filtering is enabled. The possible field values are:
  - *Checked* — Enables IGMP Snooping on the device.

- *Unchecked* — Disables IGMP Snooping on the device.

- **VLAN ID** — Specifies the VLAN ID.
- **Bridge Multicast Address** — Identifies the Multicast group MAC address/IP address.
- **Ports** — Indicates the port number on which Multicast service is configured.
- **LAGs** — Indicates the LAG number on which Multicast service is configured.
- **Of Unit** — Displays the stacking member for which the Multicast service parameters are displayed.
- **Interface** — Displays the interface on which the Multicast service is configured.
- **Interface Status** — Displays the interface status. The options are as follows:
  - *Static* — Attaches the port to the Multicast group as static member in the Static Row. The port/LAG has joined the Multicast group statically in the Current Row.
  - *Forbidden* — Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.
  - *Non* — The port is not part of a Multicast group.

2. Click the **Add** button. The *Add Multicast Group Page* opens:

***Add Multicast Group Page***



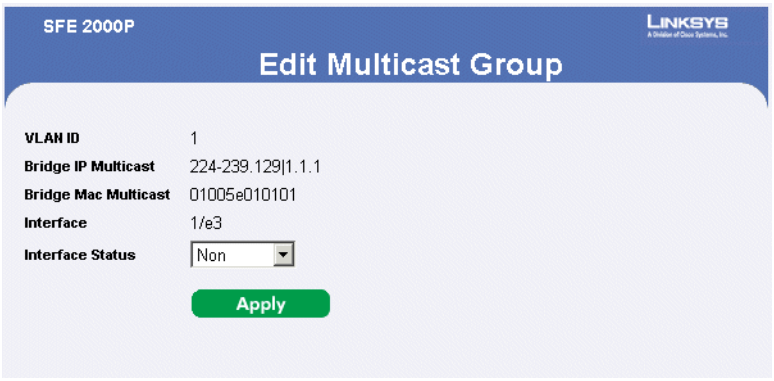

The *Add Multicast Group Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **Bridge Multicast IP Address** — Displays the IP address attached to the Multicast Group.
- **Bridge Multicast MAC Address** — Displays the MAC address attached to the Multicast Group.

*To Modify a Multicast Group*

1. Click **Bridging > Bridge Multicast> Multicast Groups**. The *Multicast Group Page* opens:
2. Click the Edit button. The Edit Multicast Group Page

***Edit Multicast Group Page***




The *Edit Multicast Group Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **Bridge Multicast IP Address** — Displays the IP address attached to the Multicast Group.
- **Bridge Multicast MAC Address** — Displays the MAC address attached to the Multicast Group.
- **Interface** — Displays the port attached to the Multicast Group.
- **Interface Status** — Displays the interface status. The options are as follows:
  - *Static* — Attaches the port to the Multicast group as static member in the Static Row. The port/LAG has joined the Multicast group statically in the Current Row.
  - *Forbidden* — Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.
  - *Excluded* — The port is not part of a Multicast group.
  - *Dynamic* — Attaches the port to the Multicast group as dynamic member.

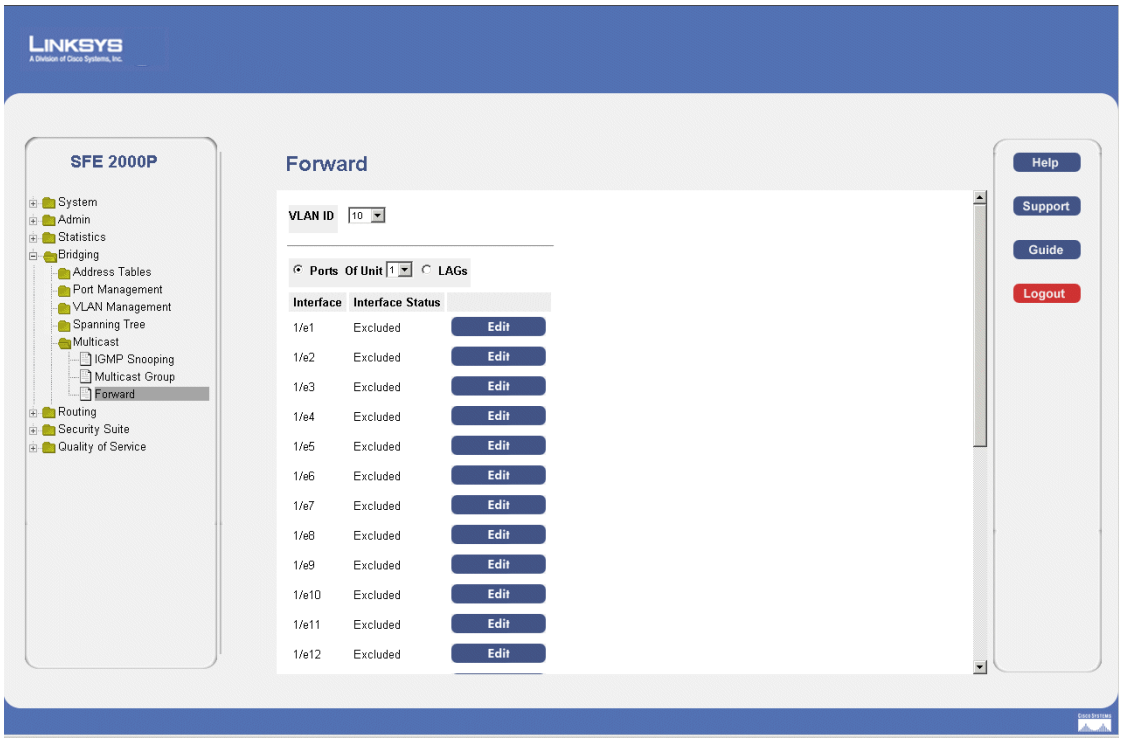
3. Define the Multicast Group Port Settings.
4. Click **Apply.** The Multicast group parameters are saved, and the device is updated.

# Defining Multicast Forwarding

The *Multicast Forward Page* contains fields for attaching ports or LAGs to a device that is attached to a neighboring Multicast router/switch. Once IGMP Snooping is enabled, Multicast packets are forwarded to the appropriate port or VLAN. To define Multicast forward settings:

1. Click **Bridging > Multicast > Forward**. The *Multicast Forward Page* opens:

***Multicast Forward Page***




The *Multicast Forward Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **Ports** — Indicates the port number on which Multicast service is configured.
- **LAGs** — Indicates the LAG number on which Multicast service is configured.
- **Of Unit** — Displays the stacking member for which the Multicast service parameters are displayed.
- **Interface** — Displays the port attached to the Multicast Group.
- **Interface Status** — Displays the interface status. The options are as follows:
  - *Static* — Attaches the port to the Multicast group as static member.
  - *Forbidden* — Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.

– *Excluded* — The port is not part of a Multicast group.

– *Dynamic* — Attaches the port to the Multicast group as dynamic member.

*Modifying Multicast Forwarding*

1. Click **Bridging > Multicast > Forward**. The *Multicast Forward Page* opens:
2. Click the **Edit** button. The *Edit Multicast Forward All Page* opens:

***Edit Multicast Forward All Page***

The *Edit Multicast Forward All Page* contains the following fields:

- **VLAN ID** — Displays the VLAN ID.
- **Interface** — Displays the port or LAG attached to the Multicast Group.
- **Interface Status** — Displays the interface status.

3. Define the relevant fields.
4. Click **Apply**. The multicast forward all settings are defined, and the device is updated.

# Configuring Spanning Tree

The Spanning Tree Protocol (STP) provides tree topography for any arrangement of bridges. STP also provides one path between end stations on a network, eliminating loops.

Loops occur when alternate routes exist between hosts. Loops in an extended network can cause bridges to forward traffic indefinitely, resulting in increased traffic and reducing network efficiency.

The device supports the following Spanning Tree versions:

- **Classic STP** — Provides a single path between end stations, avoiding and eliminating loops.
- **Rapid STP** — Detects and uses network topologies that provide faster convergence of the spanning tree, without creating forwarding loops.
- **Multiple STP** — Provides full connectivity for packets allocated to any VLAN. Multiple STP is based on the RSTP. In addition, Multiple STP transmits packets assigned to different VLANs through different MST regions. MST regions act as a single bridge.

The Spanning Tree section contains the following pages:

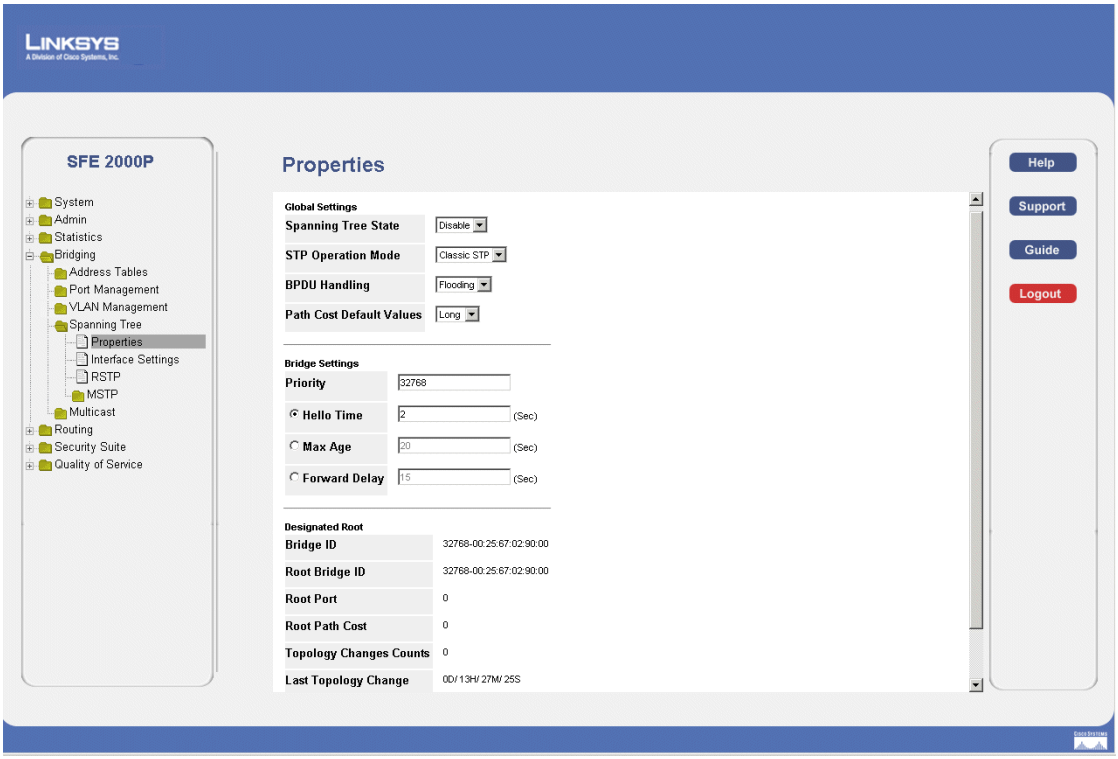
- Defining STP on Interfaces
- Defining Interface Settings
- Defining Rapid Spanning Tree
- Defining Multiple Spanning Tree

# Defining STP on Interfaces

The *STP Properties Page* contains parameters for enabling STP on the device. The *STP Properties Page* is divided into three areas, Global Settings, Bridge Settings. and Designated Root.

1. Click **Bridging** > **Spanning Tree** > **Properties**. The *STP Properties Page* opens:

***STP Properties Page***




The *STP Properties Page* contains the following fields:

The Global Settings area contains the following fields:

- **Spanning Tree State** — Indicates if STP is enabled on the device. The possible field values are:
  - *Enable* — Enables STP on the device. This is the default value.
  - *Disable* — Disables STP on the device.
- **STP Operation Mode** — Indicates the STP mode by which STP is enabled on the device. The possible field values are:
  - *Classic STP* — Enables Classic STP on the device. This is the default value.
  - *Rapid STP* — Enables Rapid STP on the device.
  - *Multiple STP* — Enables Multiple STP on the device.

- **BPDU Handling** — Determines how BPDU packets are managed when STP is disabled on the port/device. BPDUs are used to transmit spanning tree information. The possible field values are:
  - *Filtering* — Filters BPDU packets when spanning tree is disabled on an interface. This is the default value.
  - *Flooding* — Floods BPDU packets when spanning tree is disabled on an interface.
- **Path Cost Default Values** — Specifies the method used to assign default path costs to STP ports. The possible field values are:
  - *Short* — Specifies 1 through 65,535 range for port path costs. This is the default value.
  - *Long* — Specifies 1 through 200,000,000 range for port path costs.The default path costs assigned to an interface varies according to the selected method.

The Bridge Settings area contains the following fields:

- **Priority** — Specifies the bridge priority value. When switches or bridges are running STP, each is assigned a priority. After exchanging BPDUs, the device with the lowest priority value becomes the Root Bridge. The default value is 32768. The port priority value is provided in increments of 4096. For example, 4096, 8192, 12288, etc. The range is 0 to 65535.
- **Hello Time** — Specifies the device Hello Time. The Hello Time indicates the amount of time in seconds a root bridge waits between configuration messages. The default is 2 seconds. The range is 1 to 10 seconds.
- **Max Age** — Specifies the device Maximum Age Time. The Maximum Age Time indicates the amount of time in seconds a bridge waits before sending configuration messages. The default max age is 20 seconds. The range is 6 to 40 seconds.
- **Forward Delay** — Specifies the device forward delay time. The Forward Delay Time indicates the amount of time in seconds a bridge remains in a listening and learning state before forwarding packets. The default is 15 seconds. The range is 4 to 30 seconds.

The Designated Root area contains the following fields:

- **Bridge ID** — Identifies the Bridge ID and MAC address.
- **Root Bridge ID**— Identifies the Root Bridge priority and MAC address.
- **Root Port** — Indicates the port number that offers the lowest cost path from this bridge to the Root Bridge. It is significant when the Bridge is not the Root. The default is zero.
- **Root Path Cost** — The cost of the path from this bridge to the root.
- **Topology Changes Counts** — Indicates the total amount of STP state changes that have occurred.
- **Last Topology Change** — Indicates the amount of time that has elapsed since the bridge was initialized or reset, and the last topographic change occurred. The time is displayed in a day hour minute second format, for example, 2 days 5 hours 10 minutes and 4 seconds:

2. Define the relevant fields.

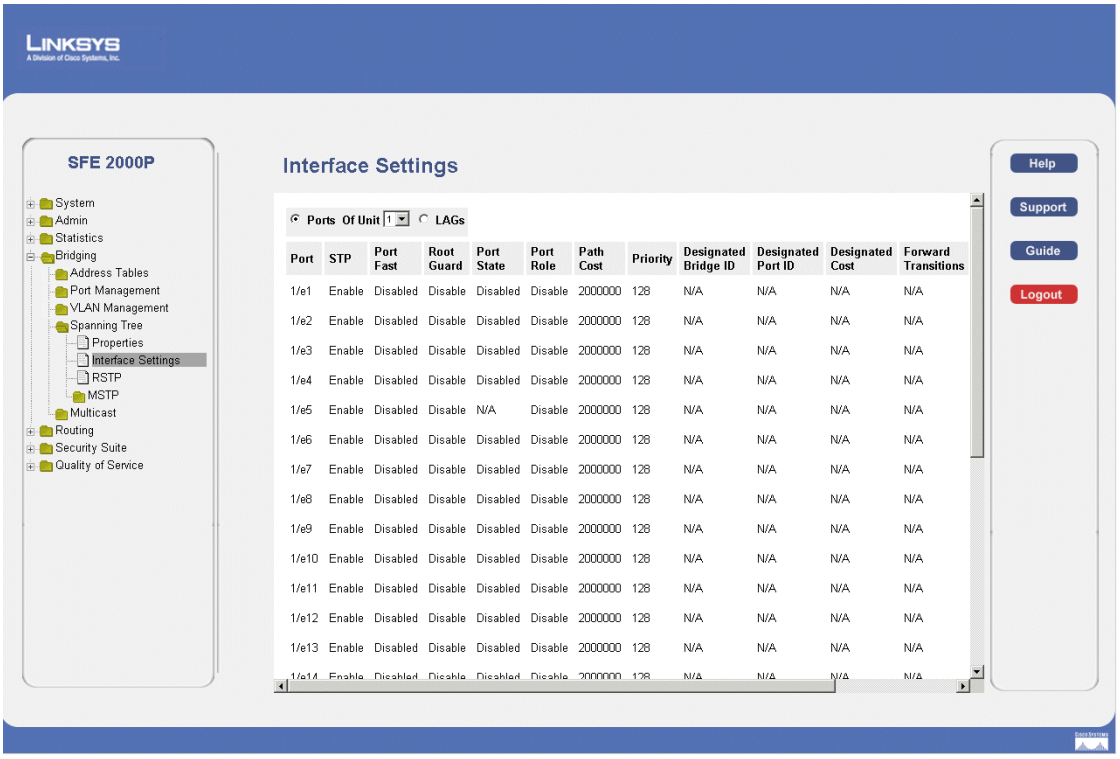
3. Click **Apply**. STP is enabled, and the device is updated.

# Defining Interface Settings

Network administrators can assign STP settings to specific interfaces using the *STP Interface Settings Page*. To assign STP settings to an interface:

1. Click **Bridging** > **Spanning Tree** > **Interface Settings**. The *Interface Settings Page* opens:

***Interface Settings Page***




The *STP Interface Settings Page* contains the following fields:

- **Ports** — Indicates the port number on which Spanning Tree is configured.
- **LAGs** — Indicates the LAG number on which Spanning Tree is configured.
- **Of Unit** — Displays the stacking member for which the Spanning Tree parameters are displayed.
- **Port** — Indicates the port or LAG on which STP is enabled.
- **STP** — Indicates if STP is enable on the port. The possible field values are:
  - *Enable* — Indicates that STP is enabled on the port.
  - *Disables* — Indicates that STP is disabled on the port.
- **Port Fast** — Indicates if Fast Link is enabled on the port. If Fast Link mode is enabled for a port, the Port State is automatically placed in the Forwarding state when the port link is up. Fast Link

optimizes the STP protocol convergence. STP convergence can take 30-60 seconds in large networks.

- **Root Guard** — Prevents devices outside the network core from being assigned the spanning tree root.
- **Port State** — Displays the current STP state of a port. If enabled, the port state determines what forwarding action is taken on traffic. Possible port states are:
  - *Disabled* — Indicates that STP is currently disabled on the port. The port forwards traffic while learning MAC addresses.
  - *Blocking* — Indicates that the port is currently blocked and cannot forward traffic or learn MAC addresses. Blocking is displayed when Classic STP is enabled.
  - *Listening* — Indicates that the port is in Listening mode. The port cannot forward traffic nor can it learn MAC addresses.
  - *Learning* — Indicates that the port is in Learning mode. The port cannot forward traffic, however it can learn new MAC addresses.
  - *Forwarding* — Indicates that the port is in Forwarding mode. The port can forward traffic and learn new MAC addresses.
- **Port Role** — Displays the port role assigned by the STP algorithm to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to the root switch.
  - *Designated* — The port or LAG through which the designated switch is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root switch from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link, or when a LAN has two or more connections connected to a shared segment.
  - *Disabled* — The port is not participating in the Spanning Tree.
- **Path Cost** — Indicates the port contribution to the root path cost. The path cost is adjusted to a higher or lower value, and is used to forward traffic when a path being rerouted.
- **Priority** — Priority value of the port. The priority value influences the port choice when a bridge has two ports connected in a loop. The priority value is between 0 -240. The priority value is provided in increments of 16.
- **Designated Bridge ID** — Indicates the bridge priority and the MAC Address of the designated bridge.
- **Designated Port ID** — Indicates the selected port's priority and interface.

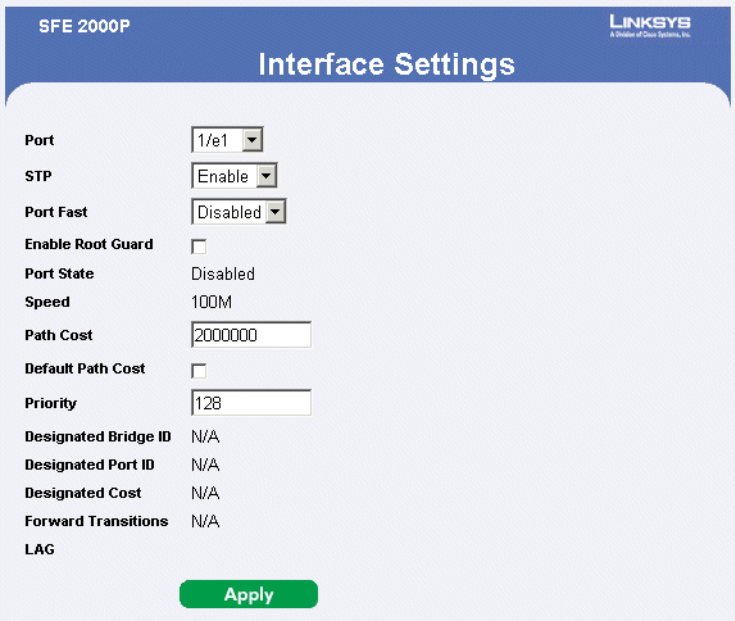
- **Designated Cost** — Indicates the cost of the port participating in the STP topology. Ports with a lower cost are less likely to be blocked if STP detects loops.
- **Forward Transitions** — Indicates the number of times the port has changed from the **Blocking** state to **Forwarding** state.
- **LAG** — Displays the LAG of which this port is a member, if relevant. If a port is a member of a LAG, the LAG settings override the port settings.

2. Define the relevant fields.
3. Click **Apply**. STP is enabled on the interface, and the device is updated.

*Modifying Interface Settings*

1. Click **Bridging** > **Spanning Tree** > **Interface Settings**. The *Interface Settings Page* opens:
2. Click the **Edit** button. The *Interface Settings Page* opens:

***Interface Settings Page***




The *Interface Settings Page* contains the following fields:

- **Ports** — Indicates the port number on which Spanning Tree is configured.
- **STP** — Indicates if STP is enable on the port. The possible field values are:
  - *Enable* — Indicates that STP is enabled on the port.
  - *Disable* — Indicates that STP is disabled on the port.
- **Port Fast** — Indicates if Fast Link is enabled on the port. If Fast Link mode is enabled for a port, the Port State is automatically placed in the Forwarding state when the port link is up. Fast Link

optimizes the STP protocol convergence. STP convergence can take 30-60 seconds in large networks.

- **Enable Root Guard** — Enable the prevention of a devices outside the network core from being assigned the spanning tree root.
- **Port State** — Displays the current STP state of a port. If enabled, the port state determines what forwarding action is taken on traffic. Possible port states are:
  - *Disabled* — Indicates that STP is currently disabled on the port. The port forwards traffic while learning MAC addresses.
  - *Blocking* — Indicates that the port is currently blocked and cannot forward traffic or learn MAC addresses. Blocking is displayed when Classic STP is enabled.
  - *Listening* — Indicates that the port is in Listening mode. The port cannot forward traffic nor can it learn MAC addresses.
  - *Learning* — Indicates that the port is in Learning mode. The port cannot forward traffic, however it can learn new MAC addresses.
  - *Forwarding* — Indicates that the port is in Forwarding mode. The port can forward traffic and learn new MAC addresses.
- **Speed** — Indicates the speed at which the port is operating.
- **Path Cost** — Indicates the port contribution to the root path cost. The path cost is adjusted to a higher or lower value, and is used to forward traffic when a path being rerouted.
- **Default Path Cost** — Indicates the default path cost.
- **Priority** — Priority value of the port. The priority value influences the port choice when a bridge has two ports connected in a loop. The priority value is between 0 -240. The priority value is provided in increments of 16.
- **Designated Bridge ID** — Indicates the bridge priority and the MAC Address of the designated bridge.
- **Designated Port ID** — Indicates the selected port's priority and interface.
- **Designated Cost** — Indicates the cost of the port participating in the STP topology. Ports with a lower cost are less likely to be blocked if STP detects loops.
- **Forward Transitions** — Indicates the number of times the port has changed from the **Blocking** state to **Forwarding** state.
- **LAG** — Displays the LAG of which this port is a member, if relevant. If a port is a member of a LAG, the LAG settings override the port settings.

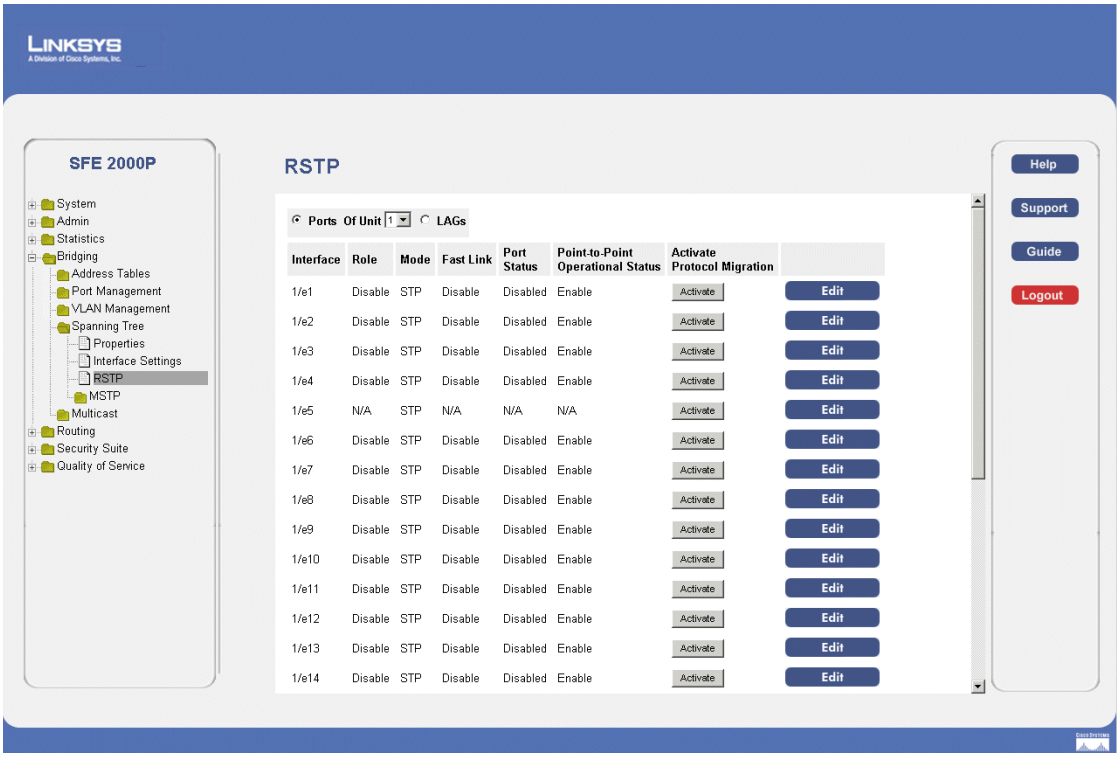
3. Define the relevant fields.
4. Click **Apply**. The interface settings are modified, and the device is updated.

# Defining Rapid Spanning Tree

While the classic spanning tree prevents Layer 2 forwarding loops in a general network topology, convergence can take between 30-60 seconds. This time may delay detecting possible loops, and propagating status topology changes. Rapid Spanning Tree Protocol (RSTP) detects and uses network topologies that allow a faster STP convergence without creating forwarding loops.

1. Click **Bridging** > **Spanning Tree** > **RSTP**. The *RSTP Page* opens:

***RSTP Page***




The *RSTP Page* contains the following fields:

- **Ports** — Indicates the port number on which RSTP is configured.
- **LAGs** — Indicates the LAG number on which RSTP is configured.
- **Of Unit** — Displays the stacking member for which the RSTP parameters are displayed.
- **Interface** — Displays the port or LAG on which Rapid STP is enabled.
- **Role** — Indicates the port role assigned by the STP algorithm in order to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to root switch.
  - *Designated* — Indicates that the port or LAG via which the designated switch is attached to the LAN.

  - *Alternate* — Provides an alternate path to the root switch from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link. Backup ports also occur when a LAN has two or more connections connected to a shared segment.
  - *Disabled* — Indicates the port is not participating in the Spanning Tree.

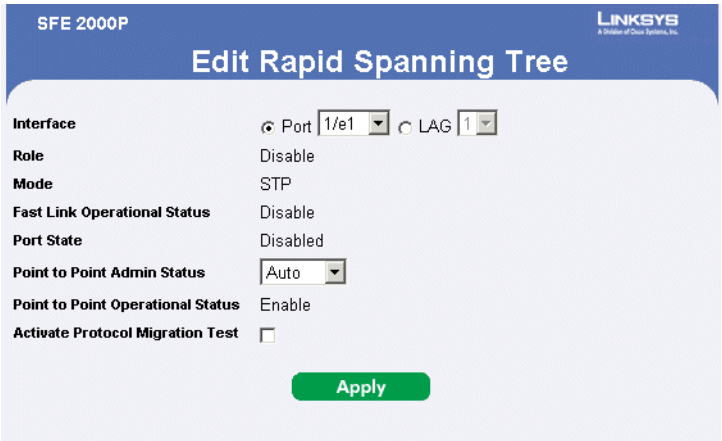
- **Mode** — Indicates the current Spanning Tree mode. The Spanning Tree mode is selected in the *Global STP* page. The possible field values are:
  - *Classic STP* — Indicates that Classic STP is enabled on the device.
  - *Rapid STP* — Indicates that Rapid STP is enabled on the device.
  - *Multiple STP* — Indicates that Multiple STP is enabled on the device.
- **Fast Link** — Indicates if Fast Link is enabled or disabled for the port or LAG. If Fast Link is enabled for a port, the port is automatically placed in the forwarding state.
- **Port Status** — Indicates if RSTP is enabled on the interface. The possible field values are:
  - *Enable* — Indicates that RSTP is enabled on the port.
  - *Disable* — Indicates that RSTP is disabled on the port.
- **Point-to-Point Operational Status** — Indicates the Point-to-Point operating state.
- **Activate Protocol Migration** — Runs a Protocol Migration Test. The test sends Link Control Protocol (LCP) packets to test if a data link is enabled.

2. Define the relevant fields.
3. Click **Apply**. The Rapid Spanning Tree Settings are defined, and the device is updated.

*Modifying RTSP*

1. Click **Bridging** > **Spanning Tree** > **RSTP**. The *RSTP Page* opens:
2. Click the **Edit** button. The *Edit Rapid Spanning Tree Page* opens:

***Edit Rapid Spanning Tree Page***




The *Edit Rapid Spanning Tree Page* contains the following fields:

- **Interface** — Displays the port or LAG on which Rapid STP is enabled.
- **Role** — Indicates the port role assigned by the STP algorithm in order to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to root switch.
  - *Designated* — Indicates that the port or LAG via which the designated switch is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root switch from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link. Backup ports also occur when a LAN has two or more connections connected to a shared segment.
  - *Disabled* — Indicates the port is not participating in the Spanning Tree.
- **Mode** — Indicates the current Spanning Tree mode. The Spanning Tree mode is selected in the *Global STP* page. The possible field values are:
  - *Classic STP* — Indicates that Classic STP is enabled on the device.
  - *Rapid STP* — Indicates that Rapid STP is enabled on the device.
  - *Multiple STP* — Indicates that Multiple STP is enabled on the device.
- **Fast Link Operational Status**— Indicates if Fast Link is enabled or disabled for the port or LAG. If Fast Link is enabled for a port, the port is automatically placed in the forwarding state.
- **Port State** — Indicates if RSTP is enabled on the interface. The possible field values are:
  - *Enable* — Indicates that RSTP is enabled on the port.

  - *Disable* — Indicates that RSTP is disabled on the port.

- **Point-to-Point Admin Status** — Indicates if a point-to-point links is established, or permits the device to establish a point-to-point link. The possible field values are:

  - *Enable* — Enables the device to establish a point-to-point link, or specifies for the device to automatically establish a point-to-point link. To establish communications over a point-to-point link, the originating PPP first sends Link Control Protocol (LCP) packets to configure and test the data link. After a link is established and optional facilities are negotiated as needed by the LCP, the originating PPP sends Network Control Protocols (NCP) packets to select and configure one or more network layer protocols. When each of the chosen network layer protocols has been configured, packets from each network layer protocol can be sent over the link. The link remains configured for communications until explicit LCP or NCP packets close the link, or until some external event occurs. This is the actual switch port link type. It may differ from the administrative state.

  - *Disable* — Disables point-to-point link.

- **Point-to-Point Operational Status** — Indicates the Point-to-Point operating state.

- **Activate Protocol Migration Test**— Runs a Protocol Migration Test. The test sends Link Control Protocol (LCP) packets to test if a data link is enabled.

3. Define the relevant fields.

4. Click **Apply**. The Rapid Spanning Tree Settings are modified, and the device is updated.

# Defining Multiple Spanning Tree

MSTP provides differing load balancing scenarios. For example, while port A is blocked in one STP instance, the same port is placed in the Forwarding State in another STP instance. The *MSTP Properties* page contains information for defining global MSTP settings, including region names, MSTP revisions, and maximum hops.

The MSTP section contains the following pages:

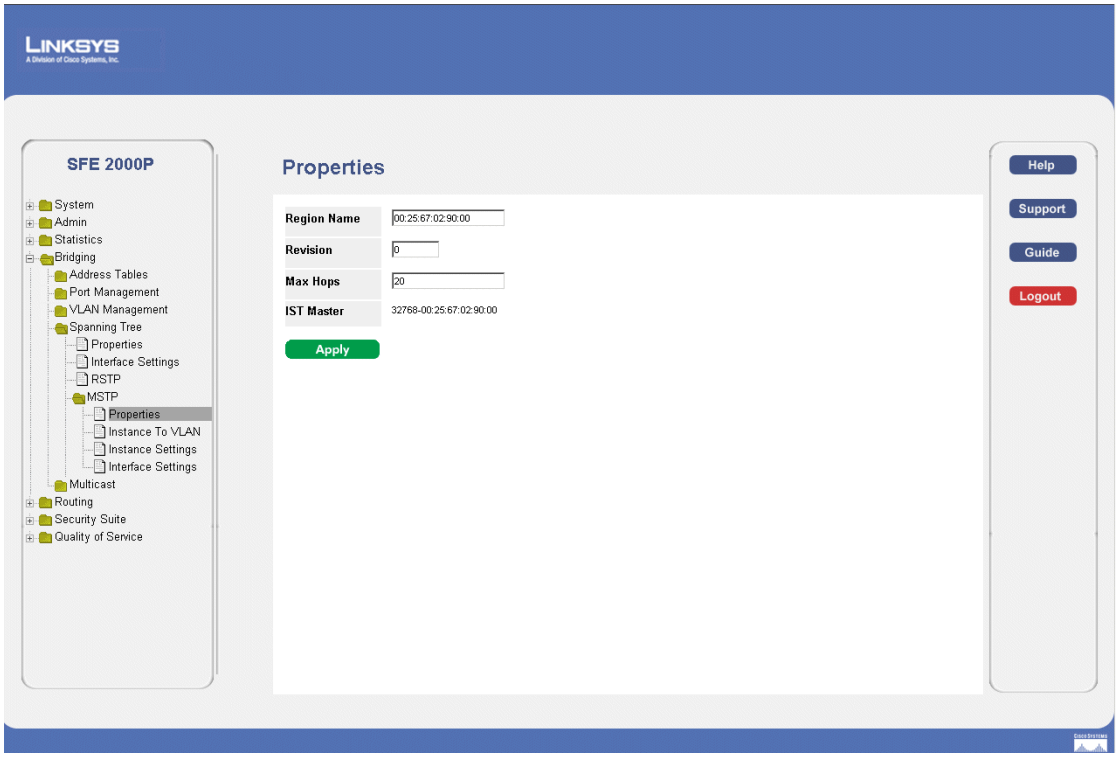
- Defining MSTP Properties
- Instance to VLAN
- Instance Settings
- Interface Settings

## Defining MSTP Properties

The *MSTP Properties Page* contains information for defining global MSTP settings, including region names, MSTP revisions, and maximum hops. To define MSTP:

1. Click **Bridging** > **Spanning Tree** > **MSTP** > **Properties**. The *MSTP Properties Page* opens:

***MSTP Properties Page***




The *MSTP Properties Page* contains the following fields:

- **Region Name** — Provides a user-defined STP region name.
- **Revision** — Defines unsigned 16-bit number that identifies the revision of the current MST configuration. The revision number is required as part of the MST configuration. The possible field range 0-65535.
- **Max Hops** — Indicates the total number of hops that occur in a specific region before the BPDU is discarded. Once the BPDU is discarded, the port information is aged out. The possible field range is 1-40. The field default is 20 hops.
- **IST Master** — Identifies the Spanning Tree Master instance. The IST Master is the specified instance root.

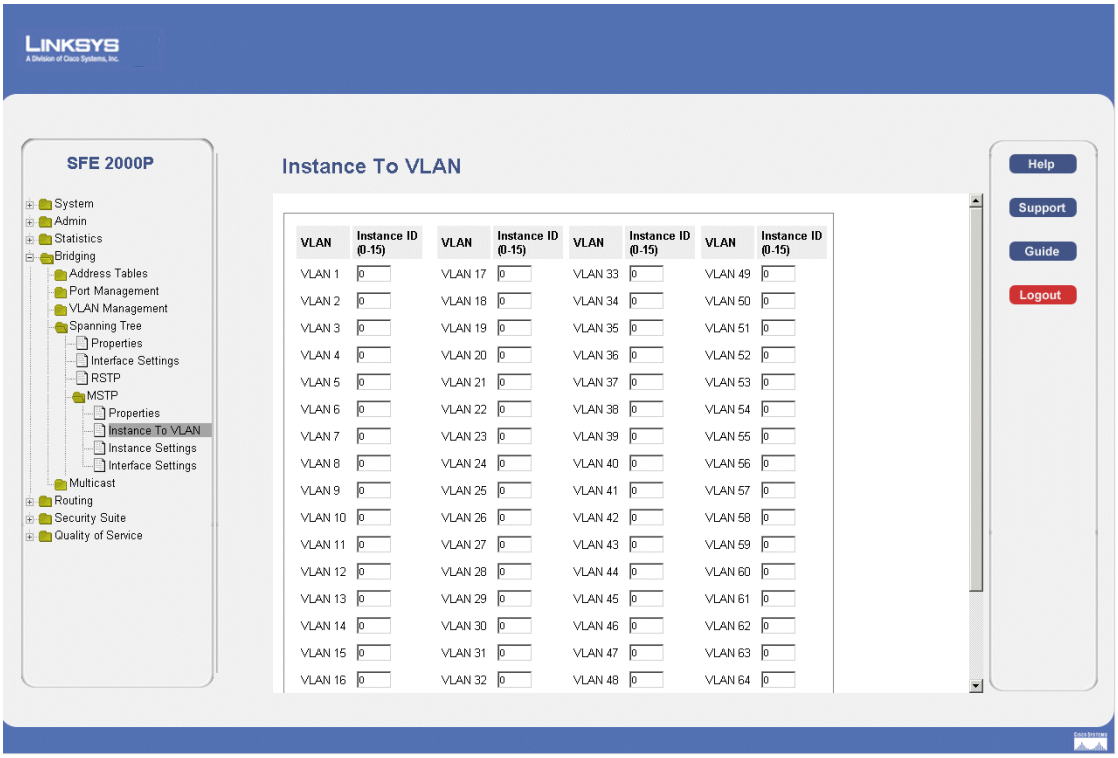
2. Define the relevant fields.
3. Click **Apply**. The MSTP properties are defined, and the device is updated.

## Instance to VLAN

The VLAN screen enables mapping VLANs to MSTP Instances.

1. Click **Bridging** > **Spanning Tree** > **MSTP** > **Instance to VLAN**. The *Instance to VLAN Page* opens:

***Instance to VLAN Page***




The *Instance to VLAN Page* contains the following fields:

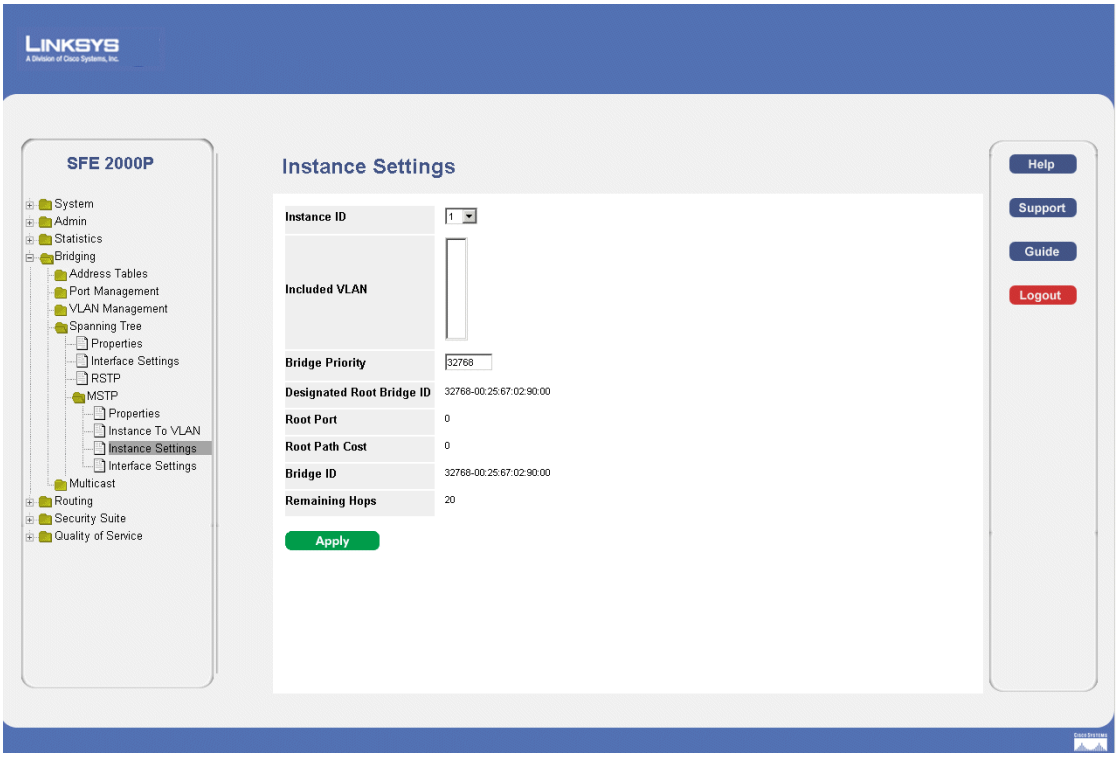
- **VLAN** – Indicates the VLAN for which the MSTP instance ID is defined.
- **Instance ID** – Indicates the MSTP instance ID assigned to the VLAN.

## Instance Settings

Network Administrators can define MSTP Instances settings using the *MSTP Instance Settings Page*.

1. **Click Bridging > Spanning Tree >** MSTP > **Instance Settings**. The *MSTP Instance Settings Page* opens:

*MSTP Instance Settings Page*




The *MSTP Instance Settings Page* contains the following fields:

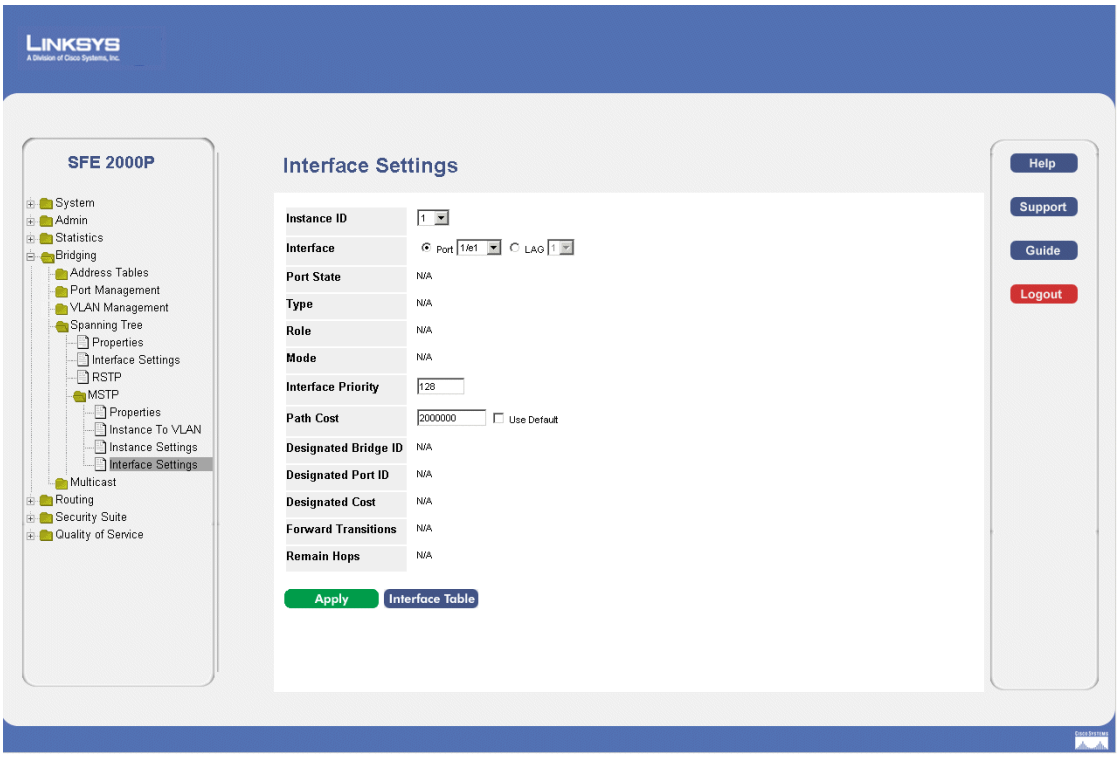
- **Instance ID** — Defines the VLAN group to which the interface is assigned.
- **Included VLAN** — Maps the selected VLAN to the selected instance. Each VLAN belongs to one instance.
- **Bridge Priority** — Specifies the selected spanning tree instance device priority. The field range is 0-61440
- **Designated Root Bridge ID** — Indicates the ID of the bridge with the lowest path cost to the instance ID.
- **Root Port** — Indicates the selected instance's root port.
- **Root Path Cost** — Indicates the selected instance's path cost.
- **Bridge ID** — Indicates the bridge ID of the selected instance.
- **Remaining Hops** — Indicates the number of hops remaining to the next destination.

## Interface Settings

Network Administrators can define MSTP Instances settings using the *MSTP Instance Settings Page*.

1. Click **Bridging** > **Spanning Tree** > **MSTP** > **Interface Settings**. The *MSTP Interface Settings Page* opens:

***MSTP Interface Settings Page***




The *MSTP Instance Settings Page* contains the following fields:

- **Instance ID** — Lists the MSTP instances configured on the device. Possible field range is 0-15.
- **Interface** — Displays the interface for which the MSTP settings are displayed. The possible field values are:
  - *Port* — Specifies the port for which the MSTP settings are displayed.
  - *LAG* — Specifies the LAG for which the MSTP settings are displayed.
- **Port State**— Indicates whether the port is enabled for the specific instance. The possible field values are:
  - *Enable* — Enables the port for the specific instance.
  - *Disable* — Disables the port for the specific instance.
  - *Forwarding* — Enables forwarding all multicast packets on a port.
- **Type** — Indicates if the port is a point-to-point port, or a port connected to a hub. The possible field values are:

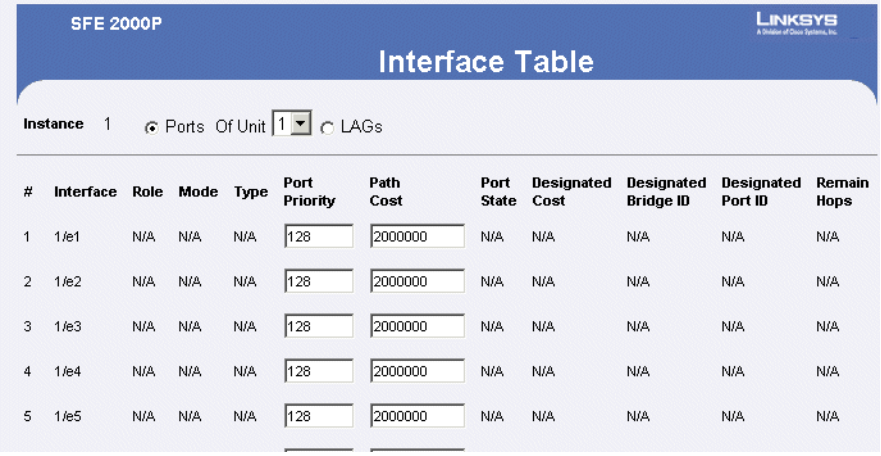
  - *Boundary Port* — Indicates the port is a boundary port. A Boundary port attaches MST bridges to LAN in an outlying region. If the port is a boundary port, it also indicates whether the device on the other side of the link is working in RSTP or STP mode
  - *Master Port* — Indicates the port is a master port. A Master port provides connectivity from a MSTP region to the outlying CIST root.
  - *Internal* — Indicates the port is an internal port.

- **Role** — Indicates the port role assigned by the STP algorithm in order to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to root device.
  - *Designated* — Indicates the port or LAG via which the designated device is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root device from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link. Backup ports also occur when a LAN has two or more connections connected to a shared segment.
  - *Disabled* — Indicates the port is not participating in the Spanning Tree.
- **Mode** — Indicates the current Spanning Tree mode. The Spanning Tree mode is selected in the *Global STP* page. The possible field values are:
  - *Classic STP* — Indicates that Classic STP is enabled on the device.
  - *Rapid STP* — Indicates that Rapid STP is enabled on the device.
  - *Multiple STP* — Indicates that Multiple STP is enabled on the device.
- **Interface Priority** — Defines the interface priority for specified instance. The default value is 128.
- **Path Cost** — Indicates the port contribution to the Spanning Tree instance. The range should always be 1-200,000,000.
- **Designated Bridge ID** — Indicates that the bridge ID number that connects the link or shared LAN to the root.
- **Designated Port ID** — Indicates that the Port ID number on the designated bridge that connects the link or the shared LAN to the root.
- **Designated Cost** — Indicates that the default path cost is assigned according to the method selected on the Spanning Tree Global Settings page.
- **Forward Transitions** — Indicates the number of times the port has changed from Forwarding state to Blocking state.
- **Remaining Hops** — Indicates the hops remaining to the next destination.

- **Interface State** — Indicates whether the port is enabled or disabled in the specific instance.

2. Click the **Interface Table** button. The *Interface Table Page* opens:

***Interface Table Page***




The *Interface Table Page* contains the following fields:

- **Instance ID** — Defines the VLAN group to which the interface is assigned.
- **Interface** — Displays the interface for which the MSTP settings are displayed. The possible field values are:
  - *Port* — Specifies the port for which the MSTP settings are displayed.
  - *LAG* — Specifies the LAG for which the MSTP settings are displayed.
- **Role** — Indicates the port role assigned by the STP algorithm in order to provide to STP paths. The possible field values are:
  - *Root* — Provides the lowest cost path to forward packets to root device.
  - *Designated* — Indicates the port or LAG via which the designated device is attached to the LAN.
  - *Alternate* — Provides an alternate path to the root device from the root interface.
  - *Backup* — Provides a backup path to the designated port path toward the Spanning Tree leaves. Backup ports occur only when two ports are connected in a loop by a point-to-point link. Backup ports also occur when a LAN has two or more connections connected to a shared segment.
  - *Disabled* — Indicates the port is not participating in the Spanning Tree.
- **Mode** — Indicates the current Spanning Tree mode. The Spanning Tree mode is selected in the *Global STP* page. The possible field values are:
  - *Classic STP* — Indicates that Classic STP is enabled on the device.

  - *Rapid STP* — Indicates that Rapid STP is enabled on the device.
  - *Multiple STP* — Indicates that Multiple STP is enabled on the device.

- **Type** — Indicates if the port is a point-to-point port, or a port connected to a hub. The possible field values are:
  - *Boundary Port* — Indicates the port is a boundary port. A Boundary port attaches MST bridges to LAN in an outlying region. If the port is a boundary port, it also indicates whether the device on the other side of the link is working in RSTP or STP mode
  - *Master Port* — Indicates the port is a master port. A Master port provides connectivity from a MSTP region to the outlying CIST root.
  - *Internal* — Indicates the port is an internal port.
- **Port Priority** — Defines the interface priority for specified instance. The default value is 128.
- **Path Cost** — Indicates the port contribution to the Spanning Tree instance. The range should always be 1-200,000,000.
- **Port State**— Indicates whether the port is enabled for the specific instance. The possible field values are:
  - *Enable* — Enables the port for the specific instance.
  - *Disable* — Disables the port for the specific instance.
  - *Forwarding* — Enables forwarding all multicast packets on a port.
- **Designated Cost** — Indicates that the default path cost is assigned according to the method selected on the Spanning Tree Global Settings page.
- **Designated Bridge ID** — Indicates that the bridge ID number that connects the link or shared LAN to the root.
- **Designated Port ID** — Indicates that the Port ID number on the designated bridge that connects the link or the shared LAN to the root.
- **Remaining Hops** — Indicates the hops remaining to the next destination.
  - *Static* — Attaches the port to the Multicast group as static member in the Static Row. The port/LAG has joined the Multicast group statically in the Current Row.
  - *Forbidden* — Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.
  - *Non* — The port is not part of a Multicast group.

# Configuring SNMP

*The Simple Network Management Protocol* (SNMP) provides a method for managing network devices. The device supports the following SNMP versions:

## SNMP v1 and v2

SNMP agents maintain a list of variables that are used to manage the device. The variables are defined in the Management Information Base (MIB). The MIB presents the variables controlled by the agent. The SNMP agent defines the MIB specification format, as well as the format used to access the information over the network. Access rights to the SNMP agents are controlled by access strings.

## SNMP v3

SNMP v3 also applies access control and a new traps mechanism to SNMPv1 and SNMPv2 PDUs. In addition, User Security Model (USM) is defined for SNMPv3 and includes:

- **Authentication —** Provides data integrity and data origin authentication.
- **Privacy —** Protects against disclosure message content. Cipher Bock-Chaining (CBC) is used for encryption. Either authentication is enabled on an SNMP message, or both authentication and privacy are enabled on a SNMP message. However privacy cannot be enabled without authentication.
- **Timeliness —** Protects against message delay or message redundancy. The SNMP agent compares the incoming message to the message time information.
- **Key Management —** Defines key generation, key updates, and key use. The device supports SNMP notification filters based on Object IDs (OID). OIDs are used by the system to manage device features. SNMP v3 supports the following features:
  - Security
  - Feature Access Control
  - Traps

The device generates the following traps:

- Copy trap
- Stacking traps

The SNMP section contains the following sections:

- Configuring SNMP Security
- Defining Trap Management

# Configuring SNMP Security

The Security section contains the following pages:

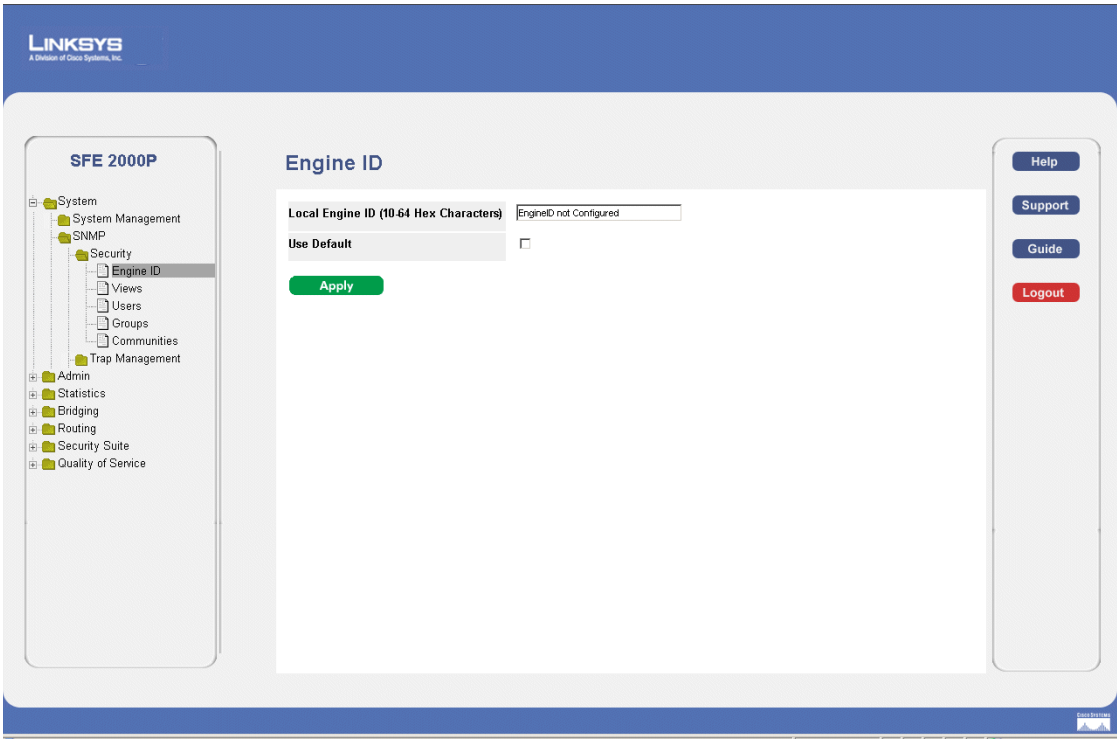
- Defining Engine ID
- Defining SNMP Views
- Defining SNMP Users
- Define SNMP Groups
- Defining SNMP Communities

## Defining Engine ID

The *Engine ID Page* provides information for defining the device engine ID.

1. Click **System** > **SNMP** > **Security** > **Engine IP**. The *Engine ID Page* opens:

***Engine ID Page***




The *Engine ID Page* contains the following fields.

- **Local Engine ID (10-64 Hex characters)** — Indicates the local device engine ID. The field value is a hexadecimal string. Each byte in hexadecimal character strings consists of two hexadecimal digits. Each byte can be separated by a period or a colon. The Engine ID must be defined before SNMPv3 is enabled. For stand-alone devices, select a default Engine ID that is comprised of Enterprise number and the default MAC address. For a stackable system configure the Engine ID, and verify

that the Engine ID is unique for the administrative domain. This prevents two devices in a network from having the same Engine ID.

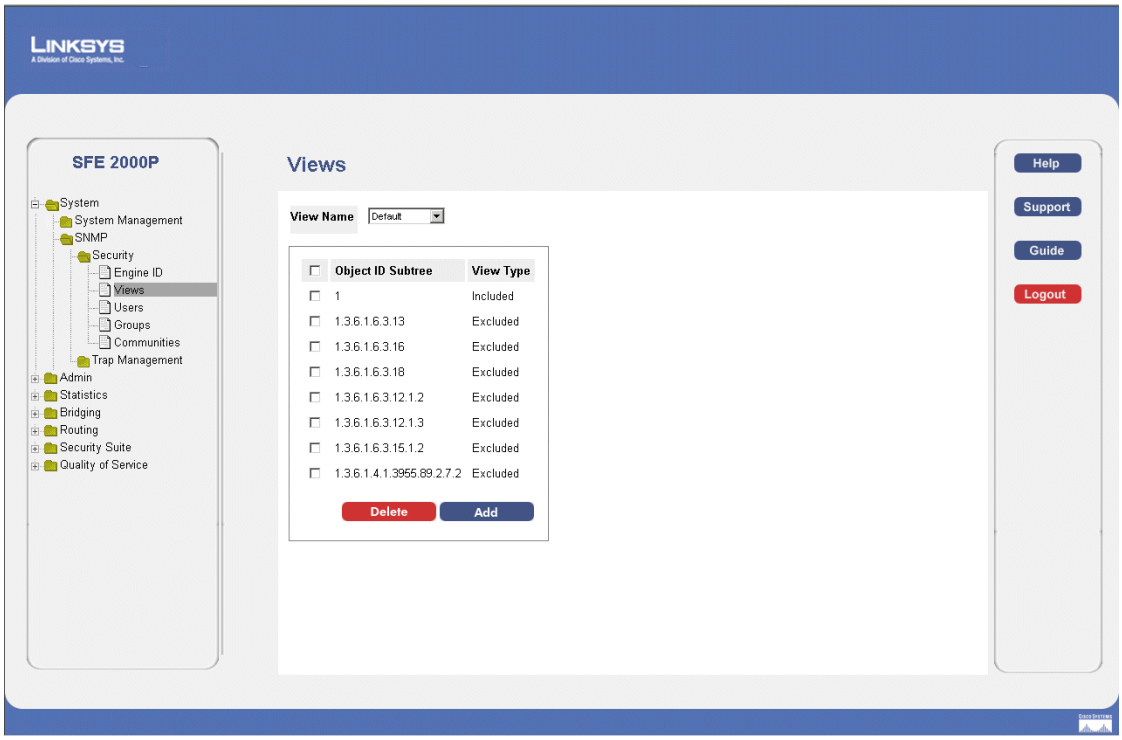
- **Use Default** — Uses the device generated Engine ID. The default Engine ID is based on the device MAC address and is defined per standard as:
  - *First 4 octets* — first bit = 1, the rest is IANA Enterprise number.
  - *Fifth octet* — Set to 3 to indicate the MAC address that follows.
  - *Last 6 octets* — MAC address of the device.

## Defining SNMP Views

SNMP Views provide access or block access to device features or feature aspects. For example, a view can be defined that states that SNMP Group A has Read Only (R/O) access to Multicast groups, while SNMP Group B has Read-Write (R/W) access to Multicast groups. Feature access is granted via the MIB name, or MIB Object ID. To define SNMP views:

1. Click **System** > **SNMP** > **Security** > **Views**. The *SNMP Views Page* opens:

***SNMP Views Page***




The SNMP Views Page contains the following fields:

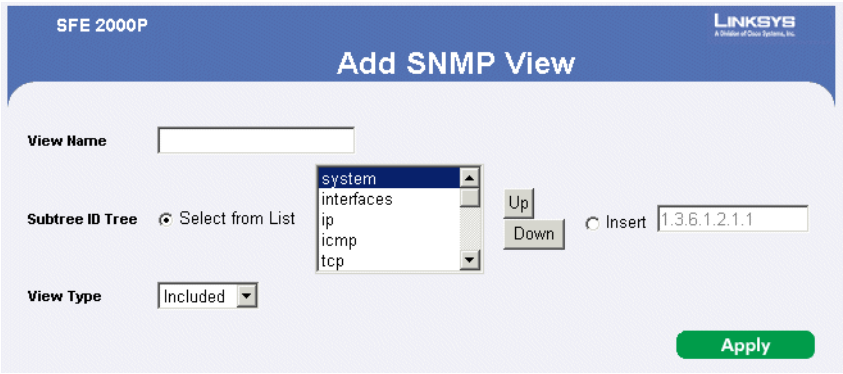
- **View Name** — Displays the user-defined views. The options are as follows:
  - *Default* — Displays the default SNMP view for read and read/write views.

  - *DefaultSuper* — Displays the default SNMP view for administrator views.

- **Object ID Subtree** — Indicates the device feature OID included or excluded in the selected SNMP view. The options to select the Subtree are as follows:
  - *Select from List* — Select the Subtree from the list provided.
  - *Insert* — Enables a Subtree not included in the *Select from List* field to be entered.
- **View Type** — Indicates if the defined OID branch will be included or excluded in the selected SNMP view.

2. Click the **Add** button. The *Add SNMP View Page* opens:

***Add SNMP View Page***




The *Add SNMP View Page* contains parameters for defining and configuring new SNMP view. The *Add SNMP View Page* contains the following fields:

- **View Name** — Displays the user-defined views. The options are as follows:
  - *Default* — Displays the default SNMP view for read and read/write views.
  - *DefaultSuper* — Displays the default SNMP view for administrator views.
- **Subtree ID Tree** — Indicates the device feature OID included or excluded in the selected SNMP view. The options to select the Subtree are as follows:
  - *Select from List* — Select the Subtree from the list provided.
  - *Up/Down* — Allows you to determine the priority by moving the selected subtree up or down in the list.
  - *Insert* — Enables a Subtree not included in the *Select from List* field to be entered.
- **View Type** — Indicates if the defined OID branch will be included or excluded in the selected SNMP view. The options to select the Subtree are as follows:
  - *Included* — Includes the defined OID branch.
  - *Excluded* — Excludes the defined OID branch.

3. Define the relevant fields.

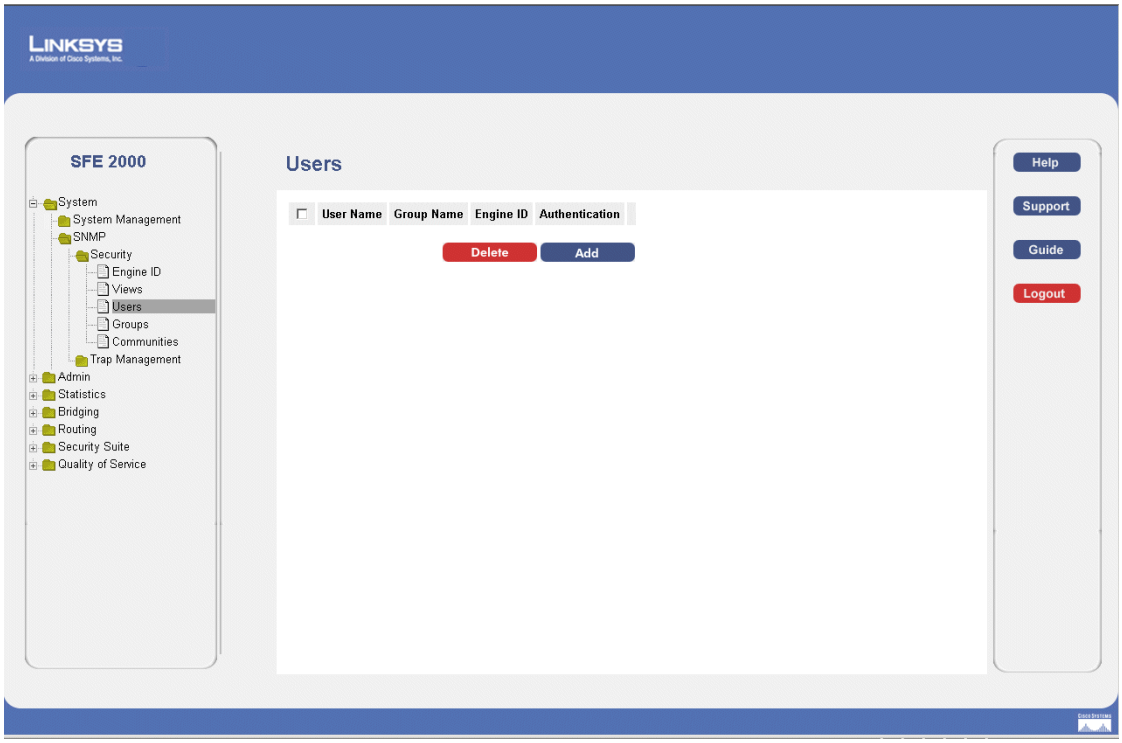
4. Click **Apply**. The SNMP views are defined, and the device is updated.

## Defining SNMP Users

The *SNMP Users Page* provides information for creating SNMP groups, and assigning SNMP access control privileges to SNMP groups. Groups allow network managers to assign access rights to specific device features, or feature aspects.

1. Click **System** > **SNMP** > **Security** > **Users**. The *SNMP Users Page* opens:

***SNMP Users Page***

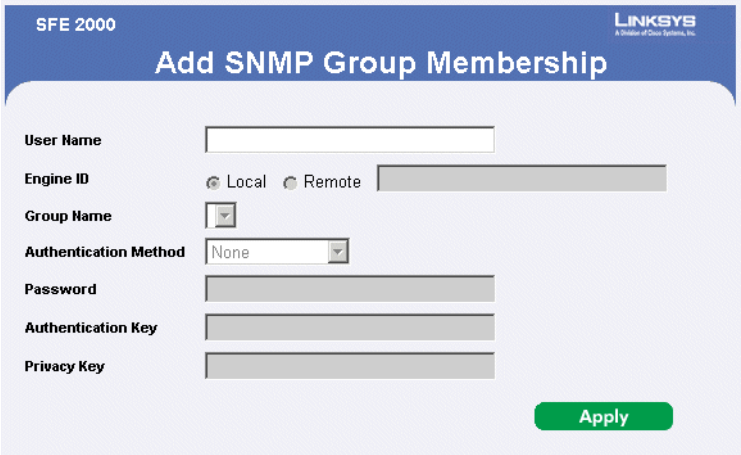



The *SNMP Users Page* contains the following fields.

- **User Name** — Displays the user-defined group to which access control rules are applied. The field range is up to 30 characters.
- **Group Name** — Displays the user-defined group to which access control rules are applied.
- **Engine ID** — Indicates the local device engine ID.
- **Authentication** — Indicates the Authentication method used.

2. Click the **Add** button. The Add SNMP Group Membership Page opens:

*Add SNMP Group Membership Page*




The *Add SNMP Group Membership Page* provides information for assigning SNMP access control privileges to SNMP groups. The *Add SNMP Group Membership Page* contains the following fields.

- **User Name** — Provides a user-defined local user list.
- **Engine ID** — Indicates either the local or remote SNMP entity to which the user is connected. Changing or removing the local SNMP Engine ID deletes the SNMPv3 User Database.
  - *Local* — Indicates that the user is connected to a local SNMP entity.
  - *Remote* — Indicates that the user is connected to a remote SNMP entity. If the Engine ID is defined, remote devices receive inform messages.
- **Group Name** — Contains a list of user-defined SNMP groups. SNMP groups are defined in the SNMP Group Profile page.
- **Authentication Method**— Indicates the Authentication method used. The possible field values are:
  - *MD5 Key* — Users are authenticated using the HMAC-MD5 algorithm.
  - *SHA Key* — Users are authenticated using the HMAC-SHA-96 authentication level.
  - *MD5 Password* — The HMAC-MD5-96 password is used for authentication. The user should enter a password.
  - *SHA Password* — Users are authenticated using the HMAC-SHA-96 authentication level. The user should enter a password.
  - *No Authentication* — No user authentication is used.
- **Password** — Define the local user password. Local user passwords can contain up to 159 characters.
- **Authentication Key** — Defines the HMAC-MD5-96 or HMAC-SHA-96 authentication level. The authentication and privacy keys are entered to define the authentication key. If only authentication is required, 16 bytes are defined. If both privacy and authentication are required, 32 bytes are defined.

Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or a colon.

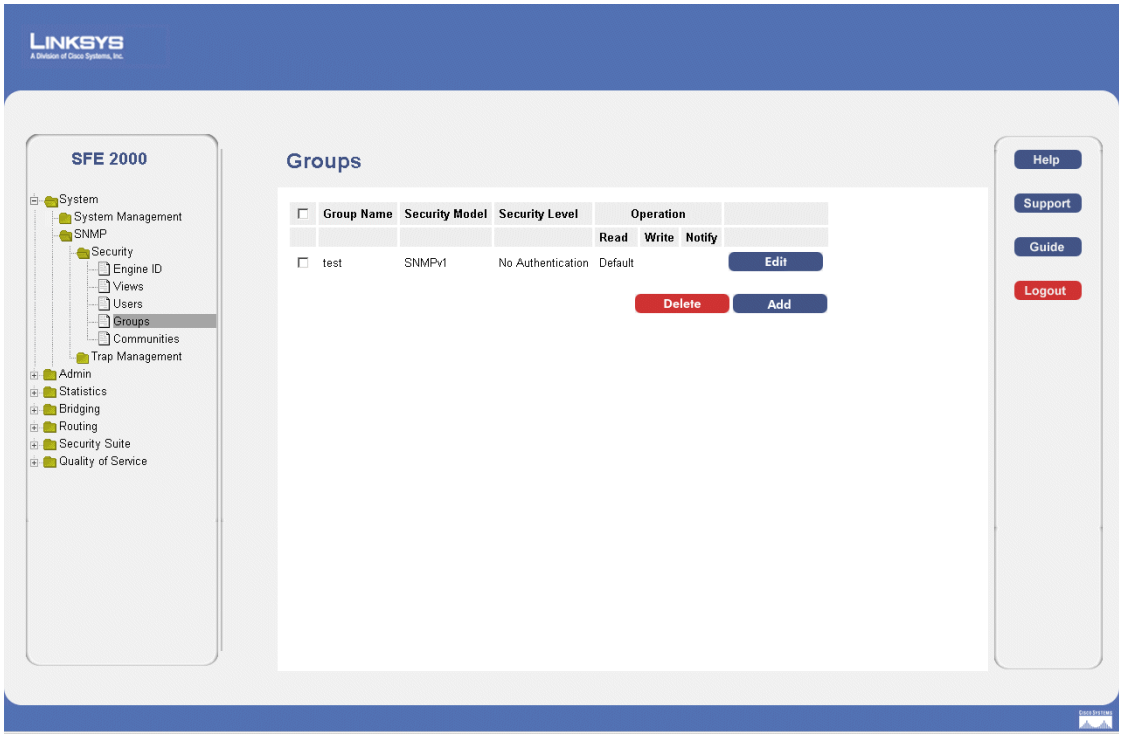
- **Privacy Key** — Defines the Privacy Key (LSB). If only authentication is required, 20 bytes are defined. If both privacy and authentication are required, 36 bytes are defined. Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or colon.

## Define SNMP Groups

The SNMP Groups Profile Page provides information for creating SNMP groups and assigning SNMP access control privileges to SNMP groups. Groups allow network managers to assign access rights to specific device features, or features aspects.

1. Click **System** > **SNMP** > **Security** > **Groups**. The *SNMP Groups Profile Page* opens:

***SNMP Groups Profile Page***




The *SNMP Groups Profile Page* contains the following fields:

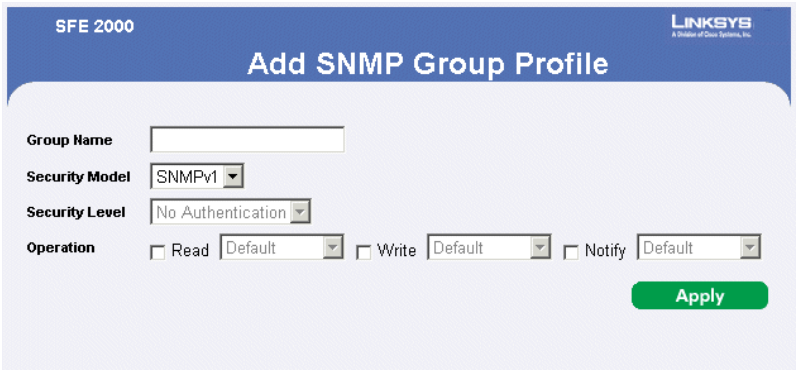
- **Group Name** — Displays the user-defined group to which access control rules are applied. The field range is up to 30 characters.
- **Security Model** — Defines the SNMP version attached to the group. The possible field values are:
  - *SNMPv1* — SNMPv1 is defined for the group.
  - *SNMPv2* — SNMPv2 is defined for the group.

– *SNMPv3* — SNMPv3 is defined for the group.

- **Security Level** — Defines the security level attached to the group. Security levels apply to SNMPv3 only. The possible field values are:
  – *No Authentication* — Indicates that neither the Authentication nor the Privacy security levels are assigned to the group.
  – *Authentication* — Authenticates SNMP messages, and ensures the SNMP messages origin is authenticated.
  – *Privacy* — Encrypts SNMP message.
- **Operation** — Defines the group access rights. The possible field values are:
  – *Read* — The management access is restricted to read-only, and changes cannot be made to the assigned SNMP view.
  – *Write* — The management access is read-write and changes can be made to the assigned SNMP view.
  – *Notify* — Sends traps for the assigned SNMP view.

2. Click the **Add** button. The *Add SNMP Group Profile Page* opens:

***Add SNMP Group Profile Page***




The *Add SNMP Group Profile Page* allows network managers to define new SNMP Group profiles. The *Add SNMP Group Profile Page* contains the following fields:

- **Group Name** — Displays the user-defined group to which access control rules are applied. The field range is up to 30 characters.
- **Security Model** — Defines the SNMP version attached to the group.
- **Security Level** — Defines the security level attached to the group. Security levels apply to SNMPv3 only.
- **Operation** — Defines the group access rights. The options for each operation Read, Write and Notify are as follows:

– *Default* — Defines the default group access rights.

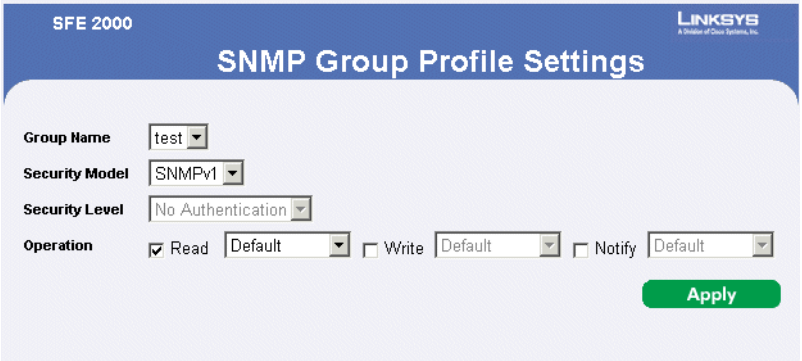
– *DefaultSuper* — Defines the default group access rights for administrator.

*Modifying SNMP Group Profile Settings*

1. Click **System** > **SNMP** > **Security** > **Groups**. The *SNMP Groups Profile Page* opens:

2. Click the **Edit** Button. The *SNMP Group Profile Settings Page* opens:

***SNMP Group Profile Settings Page***




The *SNMP Group Profile Settings Page* contains the following fields:

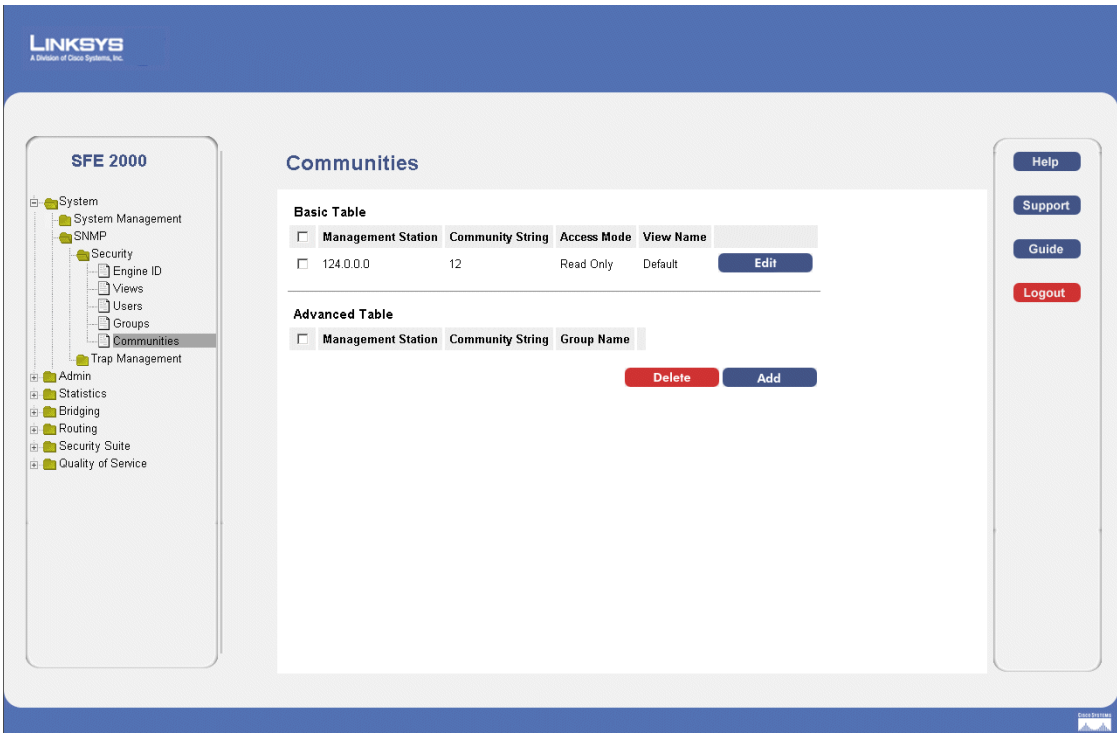
- **Group Name** — Displays the user-defined group to which access control rules are applied. The field range is up to 30 characters.
- **Security Model** — Defines the SNMP version attached to the group.
- **Security Level** — Defines the security level attached to the group. Security levels apply to SNMPv3 only.
- **Operation** — Defines the group access rights. The options for each operation Read, Write and Notify are as follows:
  – *Default* — Defines the default group access rights.
  – *DefaultSuper* — Defines the default group access rights for administrator.

## Defining SNMP Communities

The Access rights are managed by defining communities in the *SNMP Communities Page*. When the community names are changed, access rights are also changed. SNMP communities are defined only for SNMP v1 and SNMP v2c.The SNMP Communities Page contains two areas, the Basic Table and the Advanced Table. To define SNMP Communities:

1. Click **System** > **SNMP** > **Security** > **Communities**. The *SNMP Communities Page* opens:

***SNMP Communities Page***




The *SNMP Communities Page* is divided into the following tables:

- SNMP Communities Basic Table
- SNMP Communities Advanced Table

The SNMP Communities Basic Table area contains the following fields:

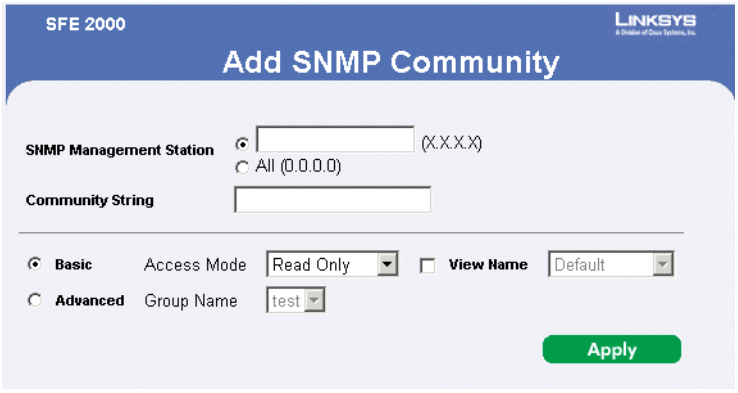
- **Management Station** — Displays the management station IP address for which the basic SNMP community is defined.
- **Community String** — Displays the password used to authenticate the management station to the device.
- **Access Mode** — Displays the access rights of the community.
- **View Name** — Displays the user-defined SNMP view.

The SNMP Communities Advanced Table area contains the following fields:

- **Management Station** — Displays the management station IP address for which the basic SNMP community is defined.
- **Community String** — Displays the password used to authenticate the management station to the device.
- **Group Name** — Displays advanced SNMP communities group name.

2. Click the **Add** button. The *Add SNMP Community Page* opens.

***Add SNMP Community Page***



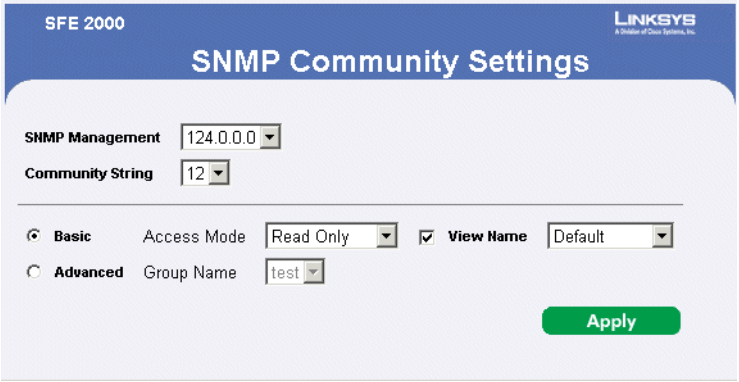

The *Add SNMP Community Page* allows network managers to define and configure new SNMP communities. The *Add SNMP Community Page* contains the following fields:

- **SNMP Management Station** — Defines the management station IP address for which the advanced SNMP community is defined. There are two definition options: Define the management station IP address.
- Select **All**, which includes all management station IP addresses.
- **Community String** — Defines the password used to authenticate the management station to the device.
- **Basic** — Enables SNMP Basic mode for a selected community and contains the following fields:
- **Access Mode** — Defines the access rights of the community. The possible field values are:
  - *Read Only* — Management access is restricted to read-only, and changes cannot be made to the community.
  - *Read Write* — Management access is read-write and changes can be made to the device configuration, but not to the community.
  - *SNMP Admin* — User has access to all device configuration options, as well as permissions to modify the community.
- **View Name** — Contains a list of user-defined SNMP views.
- **Advanced** — Enables SNMP Advanced mode for a selected community and contains the following fields:
- **Group Name** — Defines advanced SNMP communities group names.

*Modifying SNMP Community Settings*

1. Click **System** > **SNMP** > **Security** > **Communities**. The *SNMP Communities Page* opens:
2. Click the **Edit** Button. The *Edit SNMP Community Page*:

***Edit SNMP Community Page***




The *Edit SNMP Community Page* contains the following fields:

- **SNMP Management** — Defines the management station IP address for which the advanced SNMP community is defined.
- **Community String** — Defines the password used to authenticate the management station to the device.
- **Basic** — Enables SNMP Basic mode for a selected community and contains the following fields:
- **Access Mode** — Defines the access rights of the community. The possible field values are:
  - *Read Only* — Management access is restricted to read-only, and changes cannot be made to the community.
  - *Read Write* — Management access is read-write and changes can be made to the device configuration, but not to the community.
  - *SNMP Admin* — User has access to all device configuration options, as well as permissions to modify the community.
- **View Name** — Contains a list of user-defined SNMP views.
- **Advanced** — Enables SNMP Advanced mode for a selected community and contains the following fields:
  - **Group Name** — Defines advanced SNMP communities group names.

3. Define the relevant fields.
4. Click **Apply**. The SNMP Community settings are defined, and the device is updated.

# Defining Trap Management

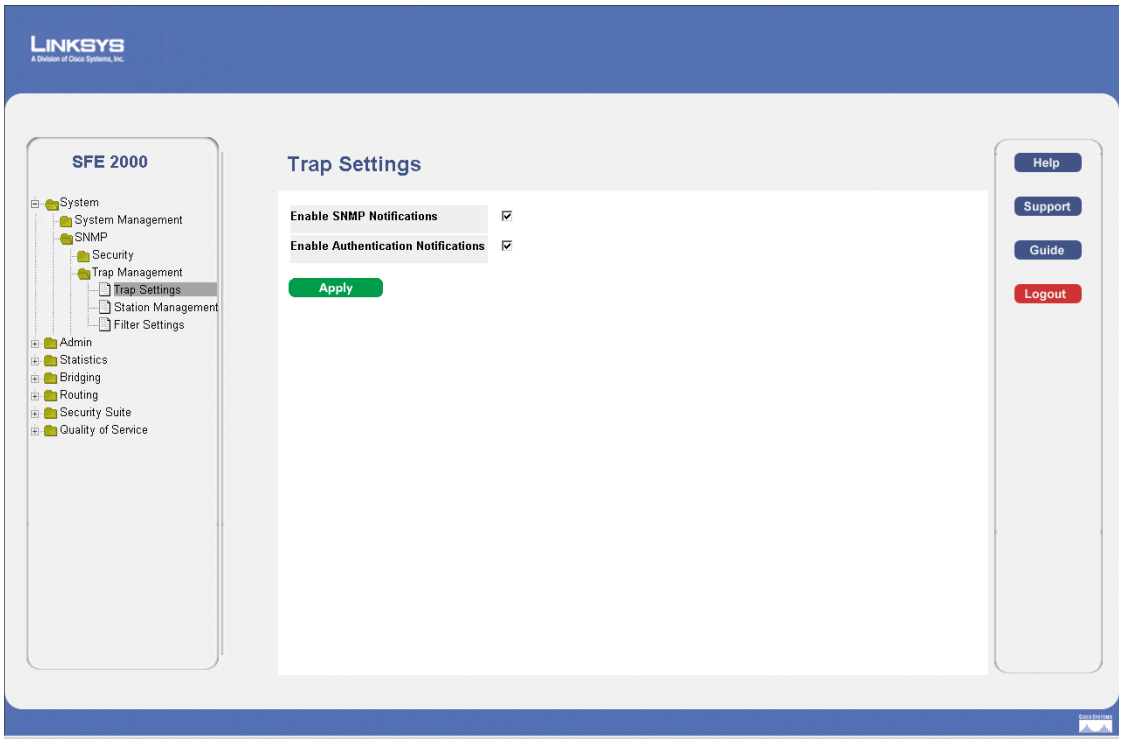
The Defining Trap Management section contains the following pages:

- Defining Trap Settings
- Configuring Station Management
- Defining SNMP Filter Settings

## Defining Trap Settings

1. Click **System** > **SNMP** > **Security** > **Trap Management > Trap Settings**. The *Trap Settings Page* opens:

***Trap Settings Page***




The *Trap Settings Page* contains the following fields:

- **Enable SNMP Notification** — Specifies whether the device can send SNMP notifications. The possible field values are:
  - *Enable* — Enables SNMP notifications.
  - *Disable* — Disables SNMP notifications.
- **Enable Authentication Notification** — Specifies whether SNMP authentication failure notification is enabled on the device. The possible field values are:

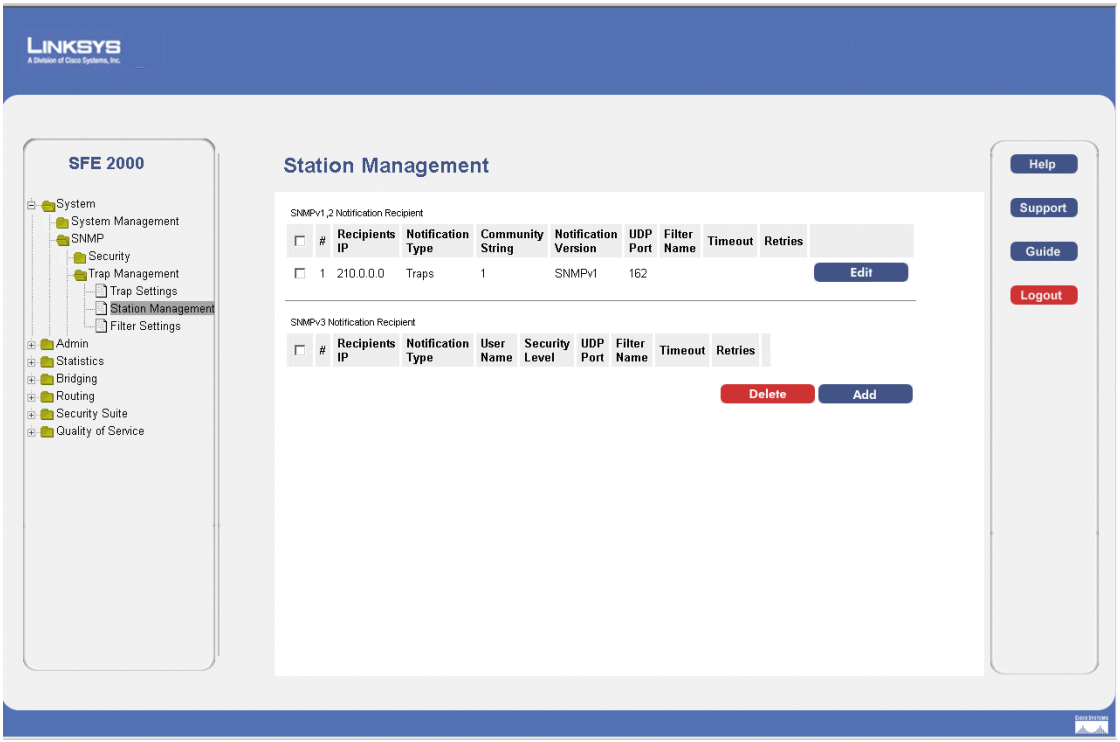
– *Enable* — Enables the device to send authentication failure notifications.

– *Disable* — Disables the device from sending authentication failure notifications.

## Configuring Station Management

1. Click **System** > **SNMP** > **Security** > **Trap Management > Station Management**. The *Station Management Page* opens:

***Station Management Page***




The *Station Management Page* contains two areas, the *SNMPv1,2 Notification Recipient* and the *SNMPv3 Notification Recipient* table.

The *SNMPv1,2 Notification Recipient* table area contains the following fields:

- **Recipients IP** — Indicates the IP address to whom the traps are sent.
- **Notification Type** — Defines the notification sent. The possible field values are:
  – *Trap* — Indicates traps are sent.
  – *Inform* — Indicates informs are sent.
- **Community String** — Identifies the community string of the trap manager.
- **Notification Version** — Determines the trap type. The possible field values are:
  – *SNMP V1* — Indicates SNMP Version 1 traps are sent.

  - *SNMP V2* — Indicates SNMP Version 2 traps are sent.

- **UDP Port** — Displays the UDP port used to send notifications. The default is 162.
- **Filter Name** — Indicates if the SNMP filter for which the SNMP Notification filter is defined.
- **Timeout** — Indicates the amount of time (seconds) the device waits before re-sending informs. The default is 15 seconds.
- **Retries —** Indicates the amount of times the device re-sends an inform request. The default is 3 seconds.

The*SNMPv3 Notification Recipient* table area contains the following fields:

- **Recipients IP** — Indicates the IP address to whom the traps are sent.
- **Notification Type** — Defines the notification sent. The possible field values are:
  - *Trap* — Indicates traps are sent.
  - *Inform* — Indicates informs are sent.
- **User Name** — Displays the SNMP Communities.
  - **Security Level** — Defines the means by which the packet is authenticated. The possible field values are:
  - *No Authentication* — Indicates the packet is neither authenticated nor encrypted.
  - *Authentication* — Indicates the packet is authenticated.
  - *Privacy* — Indicates the packet is both authenticated and encrypted.
- **UDP Port** — Displays the UDP port used to send notifications. The default is 162.
- **Filter Name** — Indicates if the SNMP filter for which the SNMP Notification filter is defined.
- **Timeout** — Indicates the amount of time (seconds) the device waits before re-sending informs. The default is 15 seconds.
- **Retries —** Indicates the amount of times the device re-sends an inform request. The default is 3 seconds.

2. Click the **Add** button. The *Add SNMP Notification Recipient Page* opens

*Add SNMP Notification Recipient Page*

The *Add SNMP Notification Recipient Page* contains information for defining filters that determine whether traps are sent to specific users, and the trap type sent. SNMP notification filters provide the following services:

- Identifying Management Trap Targets
- Trap Filtering
- Selecting Trap Generation Parameters
- Providing Access Control Checks

The *Add SNMP Notification Recipient Page* contains the following fields:

- **Recipient IP** — Indicates the IP address to whom the traps are sent.
- **Notification Type** — Defines the notification sent. The possible field values are:
  - *Trap* — Indicates traps are sent.
  - *Inform* — Indicates informs are sent.

The SNMPv1,2 Notification Recipient area contains the following fields:

- **SNMPv1,2** — Enables SNMPv1,2 as the Notification Recipient. Either SNMPv1,2 or SNMPv3 can be enabled at any one time, but not both at the same time. If SNMPv1,2 is enabled, the **Community String** and **Notification Version** fields are enabled for configuration:
- **Community String** — Identifies the community string of the trap manager.

- **Notification Version** — Determines the trap type. The possible field values are:
  - *SNMP V1* — Indicates SNMP Version 1 traps are sent.
  - *SNMP V2* — Indicates SNMP Version 2 traps are sent.

The SNMPv3 Notification Recipient area contains the following fields:

- **SNMPv3** — Enables SNMPv3 as the Notification Recipient. Either SNMPv1,2 or SNMPv3 can be enabled at any one time, but not both at the same time. If SNMPv3is enabled, the **User Name** and **Security Level** fields are enabled for configuration:
- **User Name** — Defines the user to whom SNMP notifications are sent.
- **Security Level** — Defines the means by which the packet is authenticated. The possible field values are:
  - *No Authentication* — Indicates the packet is neither authenticated nor encrypted.
  - *Authentication* — Indicates the packet is authenticated.
  - *Privacy* — Indicates the packet is both authenticated and encrypted.

The UDP Port Notification Recipient area contains the following fields:

- **UDP Port** — Displays the UDP port used to send notifications. The default is 162.
- **Filter Name** — Indicates if the SNMP filter for which the SNMP Notification filter is defined.
- **Timeout** — Indicates the amount of time (seconds) the device waits before re-sending informs. The default is 15 seconds.
- **Retries —** Indicates the amount of times the device re-sends an inform request. The default is 3 seconds.

3. Define the relevant fields.
4. Click **Apply**. The SNMP Notification Recipient settings are defined, and the device is updated.

*Modify SNMP Notifications*

The *SNMP Notification Receiver Page* allows system administrators to define notification settings. The *SNMP Notification Receiver Page* is divided into four areas, Notification Recipient, SNMPv1,2 Notification Recipient, SNMPv3 Notification Recipient and UDP Port Notification Recipient.

1. Click **System** > **SNMP** > **Security** > **Trap Management > Station Management**.
2. Click the **Edit** button. The *SNMP Notification Receiver Page* opens:

*SNMP Notification Receiver Page*

The *SNMP Notification Receiver Page* contains the following fields:

- **Recipients IP** — Indicates the IP address to whom the traps are sent.
- **Notification Type** — Defines the notification sent. The possible field values are:
  - *Trap* — Indicates traps are sent.
  - *Inform* — Indicates informs are sent.

The SNMPv1,2 Notification Recipient area contains the following fields:

- **SNMPv1,2** — Enables SNMPv1,2 as the Notification Recipient. Either SNMPv1,2 or SNMPv3 can be enabled at any one time, but not both at the same time. If SNMPv1,2 is enabled, the **Community String** and **Notification Version** fields are enabled for configuration:
- **Community String** — (SNMP v1, 2) Identifies the community string of the trap manager.
- **Notification Version** — (SNMP v1, 2) Determines the trap type. The possible field values are:
  - *SNMP V1* — Indicates SNMP Version 1 traps are sent.
  - *SNMP V2* — Indicates SNMP Version 2 traps are sent.

The SNMPv3 Notification Recipient area contains the following fields:

- **SNMPv3** — Enables SNMPv3 as the Notification Recipient. Either SNMPv1,2 or SNMPv3 can be enabled at any one time, but not both at the same time. If SNMPv3is enabled, the **User Name** and **Security Level** fields are enabled for configuration:

- **User Name** — Defines the user to whom SNMP notifications are sent.
- **Security Level** — (SNMP v3) Defines the means by which the packet is authenticated. The possible field values are:
  - *No Authentication* — Indicates the packet is neither authenticated nor encrypted.
  - *Authentication* — Indicates the packet is authenticated.
  - *Privacy* — Indicates the packet is both authenticated and encrypted.

The UDP Port Notification Recipient area contains the following fields:

- **UDP Port** — Displays the UDP port used to send notifications. The default is 162.
- **Filter Name** — Indicates if the SNMP filter for which the SNMP Notification filter is defined.
- **Timeout** — Indicates the amount of time (seconds) the device waits before re-sending informs. The default is 15 seconds.
- **Retries —** Indicates the amount of times the device re-sends an inform request. The default is 3 seconds.

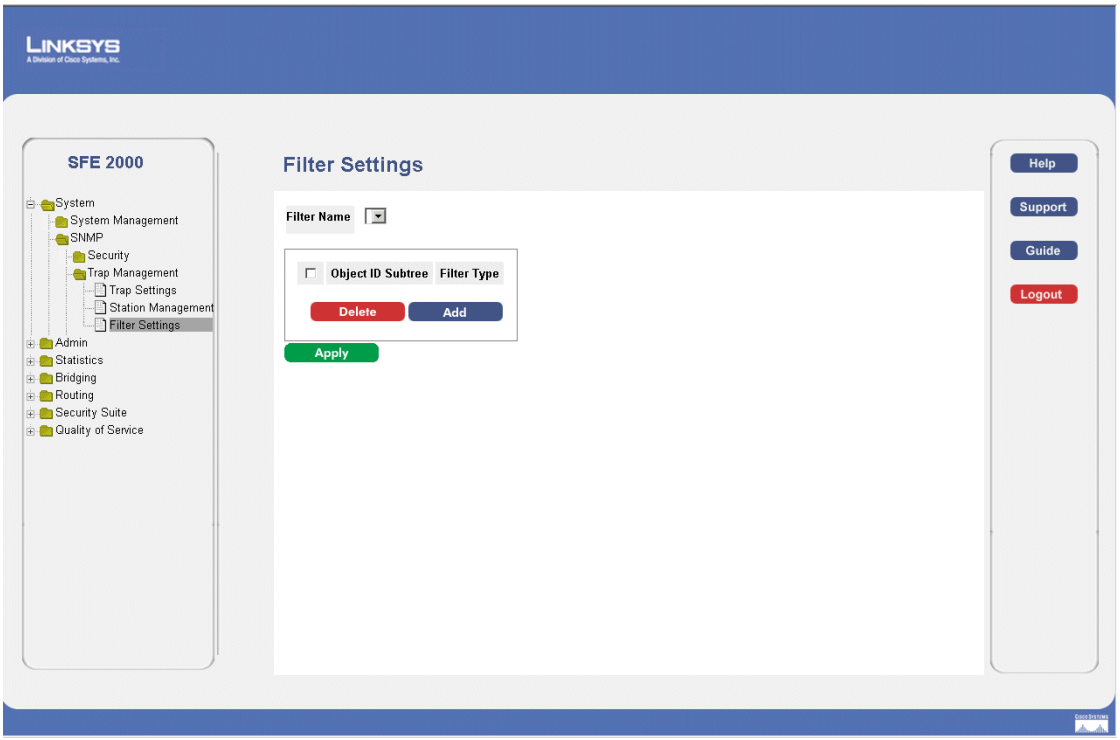
3. Define the relevant fields.
4. Click **Apply**. The SNMP Notification Receivers are defined, and the device is configured.

# Defining SNMP Filter Settings

The Filter Settings Page permits filtering traps based on OIDs. Each OID is linked to a device feature or a feature aspect. The Filter Settings Page also allows network managers to filter notifications.

1. Click **System** > **SNMP** > **Security** > **Trap Management > Filter Settings**. The *Filter Settings Page* opens:

***Filter Settings Page***



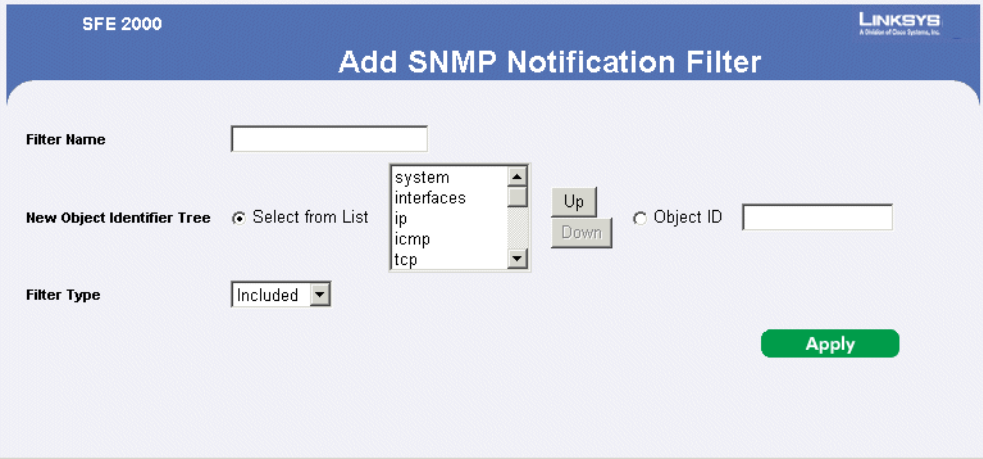

The *Filter Settings Page* contains the following fields:

- **Filter Name** — Contains a list of user-defined notification filters.
- **Object ID Subtree** — Displays the OID for which notifications are sent or blocked. If a filter is attached to an OID, traps or informs are generated and sent to the trap recipients. Object IDs are selected from either the Select from List or the Object ID List. there are two configuration options:
  - *Select from List* — Select the OID from the list provided.
  - *Up/Down* — Allows you to determine the priority by moving the selected subtree up or down in the list.
  - *Object ID* — Enter an OID not offered in the *Select from List* option.
- **Filter Type** — Indicates whether informs or traps are sent regarding the OID to the trap recipients.
  - *Excluded* — Restricts sending OID traps or informs.

– *Included* — Sends OID traps or informs.

2. Click the **Add** button. The *Add SNMP Notification Filter Page* opens:

***Add SNMP Notification Filter Page***




The *Add SNMP Notification Filter Page* contains the following fields:

- **Filter Name** — Contains a list of user-defined notification filters.
- **New Object Identifier Subtree** — Displays the OID for which notifications are sent or blocked. If a filter is attached to an OID, traps or informs are generated and sent to the trap recipients. Object IDs are selected from either the Select from List or the Object ID List. there are two configuration options:
  - *Select from List* — Select the OID from the list provided.
  - *Object ID* — Enter an OID not offered in the *Select from List* option.
- **Filter Type** — Indicates whether informs or traps are sent regarding the OID to the trap recipients.
  - *Excluded* — Restricts sending OID traps or informs.
  - *Included* — Sends OID traps or informs.

3. Define the relevant fields.
4. Click **Apply.** The SNMP Notification Filter is added to the list, and the device is updated.

# Configuring Quality of Service

Network traffic is usually unpredictable, and the only basic assurance that can be offered is best effort traffic delivery. To overcome this challenge, Quality of Service (QoS) is applied throughout the network. This ensures that network traffic is prioritized according to specified criteria, and that specific traffic receives preferential treatment. QoS in the network optimizes network performance and entails two basic facilities:

- Classifying incoming traffic into handling classes, based on an attribute, including:
  - The ingress interface
  - Packet content
  - A combination of these attributes
- Providing various mechanisms for determining the allocation of network resources to different handling classes, including:
  - The assignment of network traffic to a particular hardware queue
  - The assignment of internal resources
  - Traffic shaping

The terms Class of Service (CoS) and QoS are used in the following context:

- CoS provides varying Layer 2 traffic services. CoS refers to classification of traffic to traffic-classes, which are handled as an aggregate whole, with no per-flow settings. CoS is usually related to the 802.1p service that classifies flows according to their Layer 2 priority, as set in the VLAN header.
- QoS refers to Layer 2 traffic and above. QoS handles per-flow settings, even within a single traffic class.

The QoS facility involves the following elements:

- **Access Control Lists (ACLs)** — Used to decide which traffic is allowed to enter the system, and which is to be dropped. Only traffic that meets this criteria are subject to CoS or QoS settings. ACLs are used in QoS and network security.
- **Traffic Classification** — Classifies each incoming packet as belonging to a given traffic class, based on the packet contents and/or the context.
- **Assignment to Hardware Queues** — Assigns incoming packets to forwarding queues. Packets are sent to a particular queue for handling as a function of the traffic class to which they belong, as defined by the classification mechanism.
- **Traffic Class-Handling Attributes** — Applies QoS/CoS mechanisms to different classes, including: Bandwidth Management

The Quality of Service section contains the following section:

- Defining General Settings
- Defining Advanced Mode
- Defining QoS Basic Mode

The section also contains the following pages:

- Configuring Policy Table

# Defining General Settings

The QoS General Settings section contains the following pages:

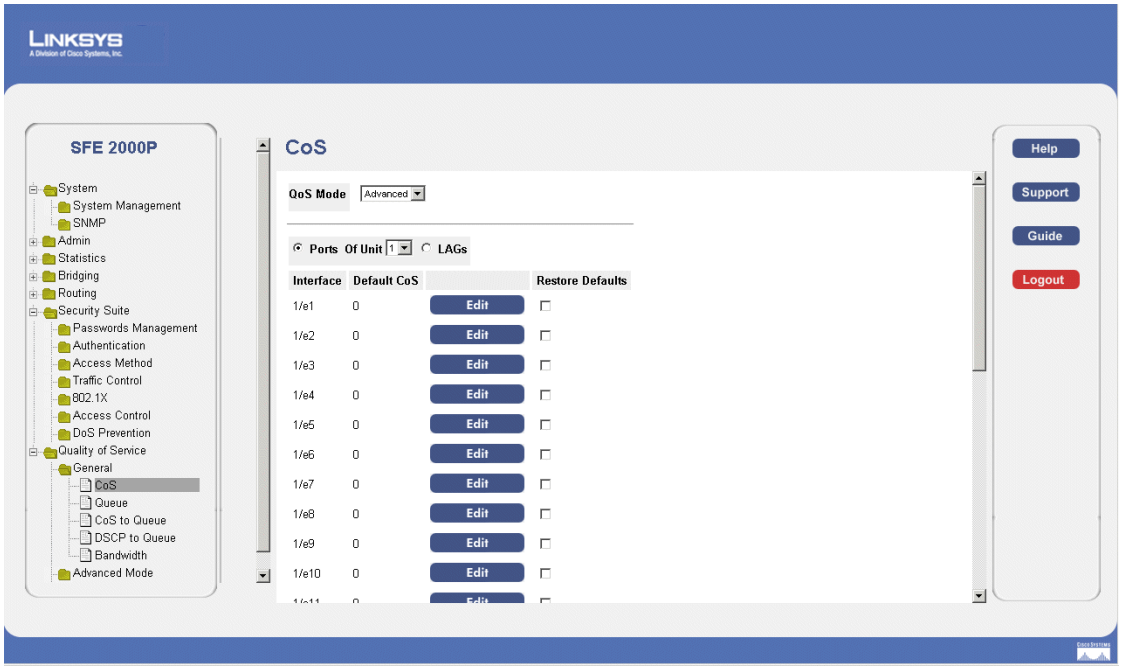
- Defining CoS
- Defining Queue
- Mapping CoS to Queue
- Mapping DSCP to Queue
- Configuring Bandwidth

## Defining CoS

The *CoS Page* contains fields for enabling or disabling CoS. In addition, the Trust mode can be selected. The Trust mode relies on predefined fields within the packet to determine the egress queue settings.

1. Click **Quality of Service** > **General** > **CoS**. The *CoS Page* opens:

***CoS Page***




The *CoS Page* contains the following fields:

- **QoS Mode** — Indicates if QoS is enabled on the interface. The possible values are:
  - Advanced — Enables Advanced mode QoS on the interface.
  - *Basic* — Enables QoS on the interface.
  - *Disable* — Disables QoS on the interface.
- **Ports** — Displays the ports CoS configuration.
- **LAGs** — Displays the LAGs CoS configuration.
- **Of Unit** — Displays the stacking member for which the CoS parameters are displayed.
- **Interface** — Indicates the interface for which the CoS information is displayed.
- **Default CoS** — Displays the default CoS value for incoming packets for which a VLAN tag is not defined. The possible field values are 0-7. The default CoS is 0.
- **Restore Defaults**— Restores the factory CoS default settings to the selected port.

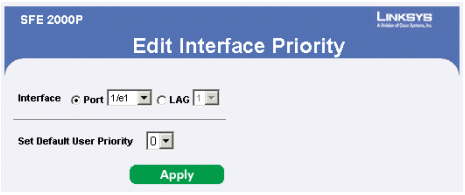
– *Checked* — Restores the factory QoS default settings to ports.

– *Unchecked*— Maintains the current QoS settings.

*Modifying Interface Priorities*

1. Click **Quality of Service** > **General** > **CoS**. The *CoS Page* opens:
2. Click the **Edit** button. The *Edit Interface Priority Page* opens:

***Edit Interface Priority Page***




The *Edit Interface Priority Page* contains the following fields:

- **Interface** — Indicates the port or LAG name.
- **Set Default User Priority**— Defines the default CoS value for incoming packets for which a VLAN tag is not defined. The possible field values are 0-7. The default CoS is 0.

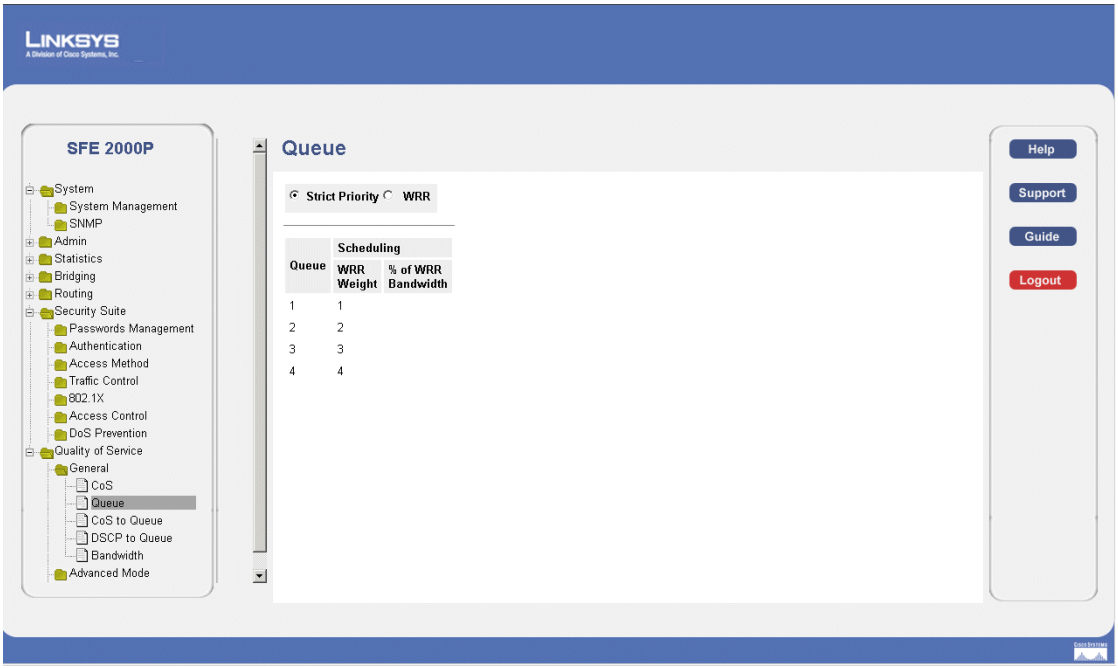
3. Modify the Interface priority.
4. Click **Apply**. The Interface priority is set, and the device is updated.

## Defining Queue

The *Queue Page* contains fields for defining the QoS queue forwarding types.

1. Click **Quality of Service** > **General** > **Queues**. The *Queue Page* opens:

***Queue Page***




The *Queue Page* contains the following fields:

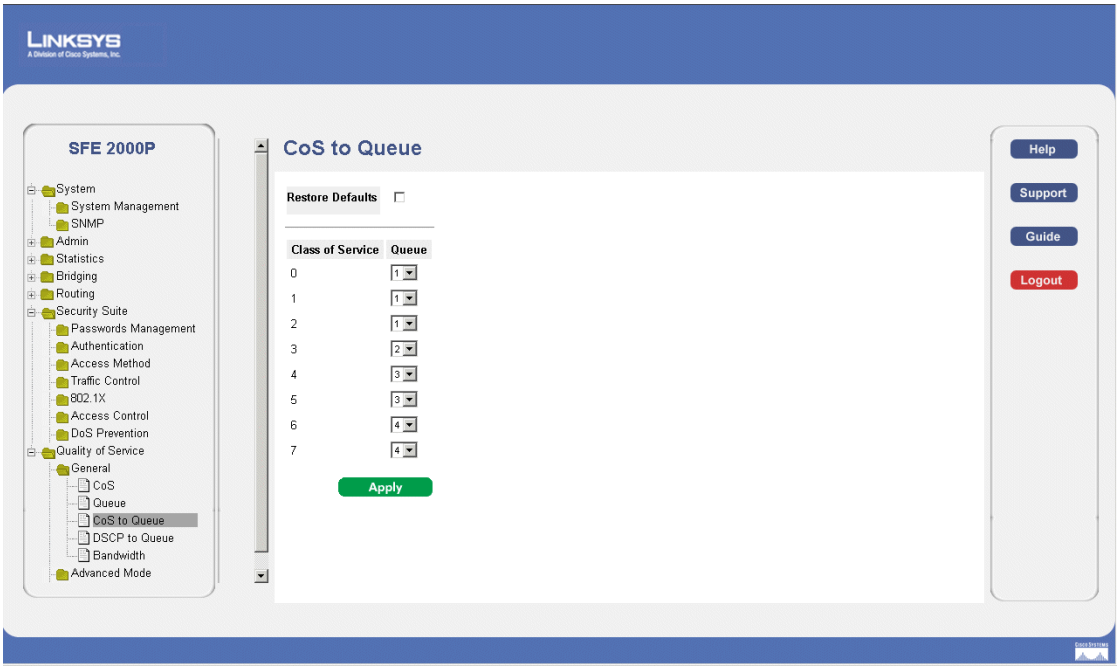
- **Strict Priority** — Indicates that traffic scheduling for the selected queue is based strictly on the queue priority.
- **WRR** — Indicates that traffic scheduling for the selected queue is based strictly on the WRR.
- **Queue** — Displays the queue for which the queue settings are displayed. The possible field range is 1 - 4.
- **WRR Weight** — Displays the WRR weights to queues.
- **% of WRR Bandwidth** — Displays the amount of bandwidth assigned to the queue. These values are fixed and are not user defined.

2. Define the queues.
3. Click **Apply**. The queues are defined, and the device is updated.

## Mapping CoS to Queue

1. Click **Quality of Service** > **General** > **CoS to Queue**. The *Cos to Queue Page* opens:

***Cos to Queue Page***




The *Cos to Queue Page* contains the following fields:

- **Restore Defaults** — Restores all queues to the default CoS settings.
- **Class of Service** — Specifies the CoS VLAN (CoS) priority tag values, where zero is the lowest and 8 is the highest.
- **Queue** — Defines the traffic forwarding queue to which the CoS priority is mapped. Four traffic priority queues are supported, where Queue 4 is the highest and Queue 1 is the lowest.

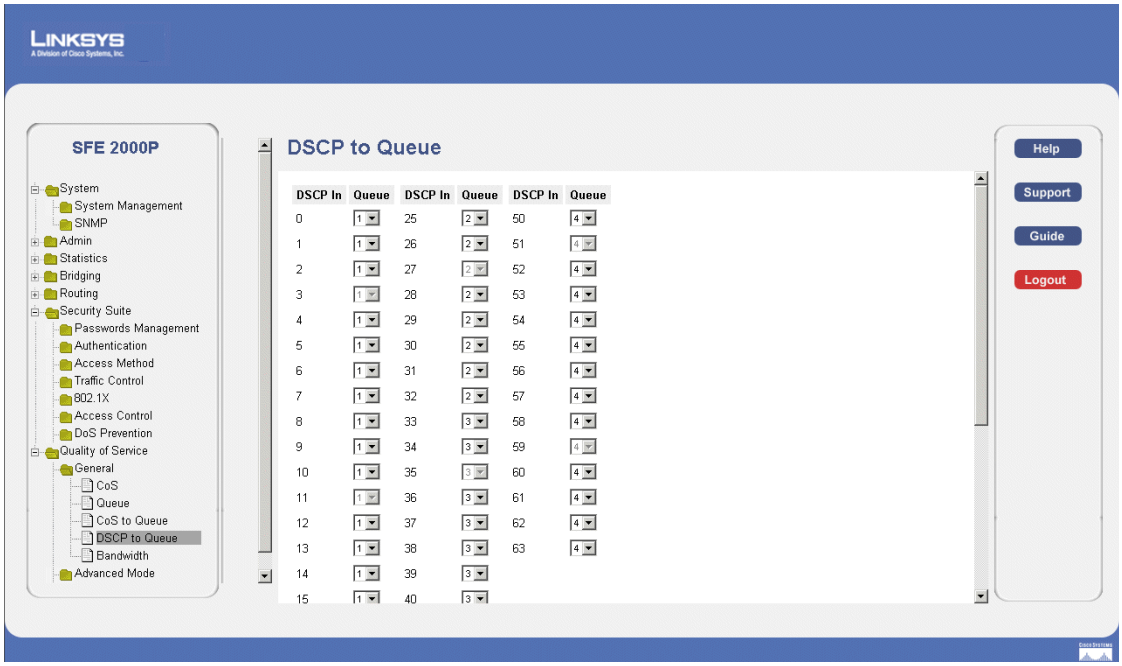
2. Define the relevant fields.
3. Click **Apply**. Cos to queues are mapped, and the device is updated.

## Mapping DSCP to Queue

The *DSCP to Queue Page* enables mapping DSCP values to specific queues. To map DCSP to Queues:

1. Click **Quality of Service** > **General** > **DSCP to Queue**. The *DSCP to Queue Page* opens:

***DSCP to Queue Page***




The *DSCP to Queue Page* contains the following fields:

- **DSCP In** — Indicates the Differentiated Services Code Point value in the incoming packet.
- **Queue** — Maps the DSCP value to the selected queue.

2. Define the relevant fields.
3. Click **Apply**. DSCP to queues are mapped, and the device is updated.

## Configuring Bandwidth

The *Bandwidth Page* allows network managers to define the bandwidth settings for a specified egress interface. Modifying queue scheduling affects the queue settings globally. The *Bandwidth* page is not used with the Service mode, as bandwidth settings are based on services.

Queue shaping can be based per queue and/or per interface. Shaping is determined by the lower specified value. The queue shaping type is selected in the *Bandwidth Page*.

1. Click **Quality of Service** > **General** > **Bandwidth**. The *Bandwidth Page* opens:

***Bandwidth Page***

The *Bandwidth Page* contains the following fields:

- **Port** — Indicates the port for which the bandwidth settings are displayed.
- **LAG** — Indicates the LAG for which the bandwidth settings are displayed.
- **Of Unit** — Displays the stacking member for which the bandwidth settings are displayed.
- **Ingress Rate Limit Status** — Indicates if rate limiting is defined on the interface. The possible field values are:
  - *Enable* — Enables ingress rate limiting on the interface.
  - *Disable* — Disables ingress rate limiting on the interface.
- **Rate Limit** — Defines the amount of bandwidth assigned to the interface. The possible field values are 62-1000000 Kbps.
- **Committed Information Rate (CIR)** — Defines CIR as the queue shaping type. The possible field value is 64-1,000,000 Kbs.
- **Committed Burst Size (CbS)** — Defines CBS as the queue shaping type. The possible field value is 4096-16,769,020 bits.

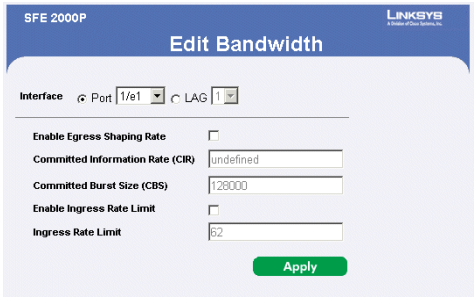
**Note** This field is not supported on FE ports.

*Modifying Bandwidth Settings*

1. Click **Quality of Service** > **General** > **Bandwidth**. The *Bandwidth Page* opens:

2. Click the **Edit** button. The *Edit Bandwidth Page* opens:

***Edit Bandwidth Page***




The *Edit Bandwidth Page* contains the following fields:

- **Interface** — Indicates the interface for which the queue shaping information is displayed. The possible field values are:
  - *Port* — Indicates the port for which the bandwidth settings are displayed.
  - *LAG* — Indicates the LAG for which the bandwidth settings are displayed.
- **Egress Shaping Rate on Selected Port** — Indicates if rate limiting is enabled on the interface.
- **Committed Information Rate (CIR)** — Defines CIR as the queue shaping type. The possible field value is 4096 - 1,000,000 Kbs.

  **Note** This field is not supported on FE ports.
- **Committed Burst Size (CbS)** — Defines CBS as the queue shaping type. The possible field value is 4096-16,769,020 bits.
- **Ingress Rate Limit Status** — Indicates if rate limiting is defined on the interface. The possible field values are:
  - *Enable* — Enables ingress rate limiting on the interface.
  - *Disable* — Disables ingress rate limiting on the interface.
- **Ingress Rate Limit** — Defines the amount of bandwidth assigned to the interface. The possible field values are 62-1000000 Kbps.

3. Modify the relevant fields.
4. Click **Apply**. The bandwidth settings are modified, and the device is updated.

# Defining Advanced Mode

Advanced QoS mode provides rules for specifying flow classification and assigning rule actions that relate to bandwidth management. The rules are defined in classification control lists (CCL).

CCLs are set according to the classification defined in the ACL, and they cannot be defined until a valid ACL is defined. When CCLs are defined, ACLs and CCLs can be grouped together in a more complex structure, called policies. Policies can be applied to an interface. Policy ACLs/CCLs are applied in the sequence they appear within the policy. Only a single policy can be attached to a port.

In advanced QoS mode, ACLs can be applied directly to an interface. However, a policy and ACL cannot be simultaneously applied to an interface.

After assigning packets to a specific queue, services such as configuring output queues for the scheduling scheme, or configuring output shaping for burst size, CIR, or CBS per interface or per queue, can be applied.

The *Advanced Mode* section contains the following pages:

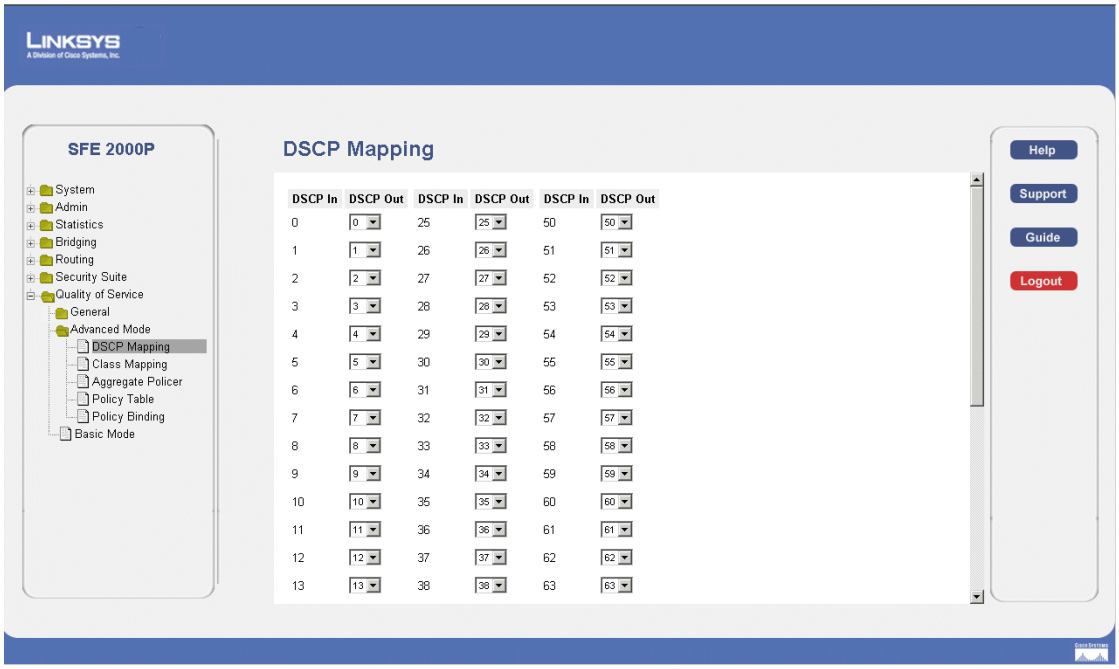
- Configuring DSCP Mapping
- Defining Class Mapping
- Defining Aggregate Policer
- Configuring Policy Table
- Defining Policy Binding

## Configuring DSCP Mapping

The *DSCP Mapping Page* enables mapping DSCP values from incoming packets to DSCP values in outgoing packets.

1. Click **Quality of Service** > **Advanced** > **DSCP Mapping**. The *DSCP Mapping Page* opens:

***DSCP Mapping Page***




The *DSCP Mapping Page* contains the following fields:

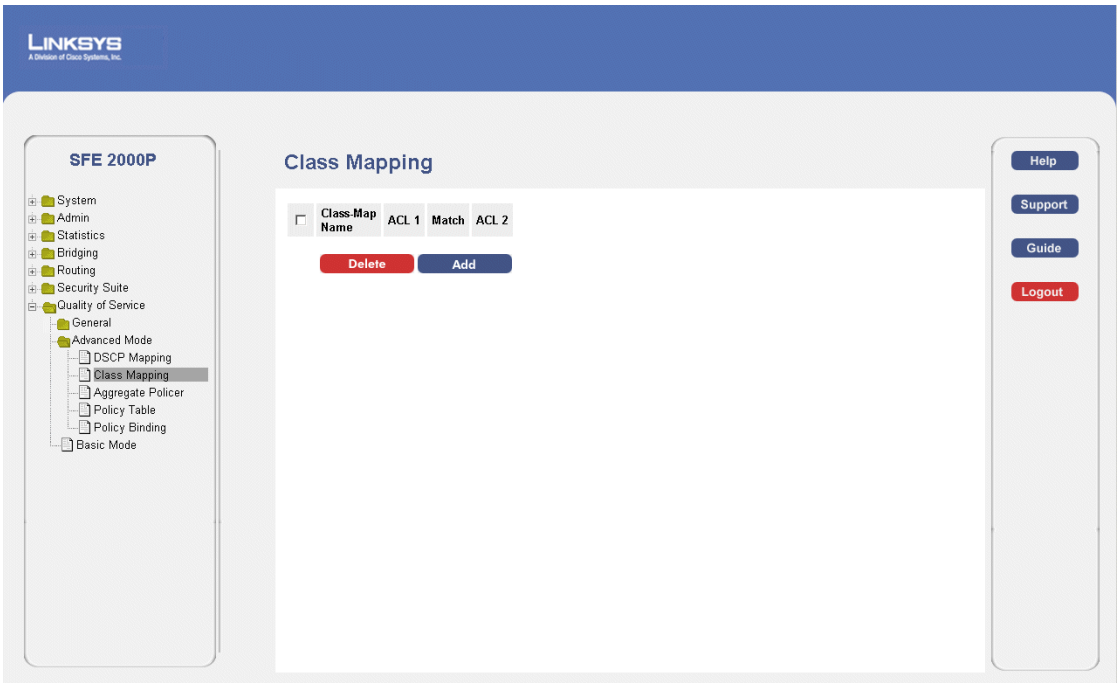
- **DSCP In** — Indicates the Differentiated Services Code Point value in the incoming packet.
- **DSCP Out** — Indicates the Differentiated Services Code Point value in the outgoing packet.

## Defining Class Mapping

The Defining Class Mapping page enables mapping DSCP values from incoming packets to DSCP values in outgoing packets.

1. Click **Quality of Service** > **Advanced** > **Class Mapping**. The *Class Mapping Page* opens:

***Class Mapping Page***

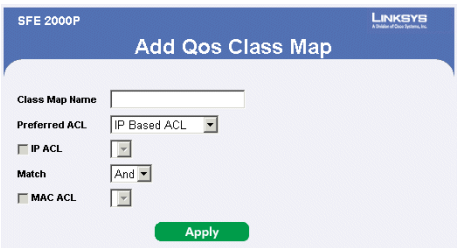



The *Class Mapping Page* contains the following fields:

- **Class Map Name** — Selects an existing Class Map by name.
- **ACL1** — Contains a list of the user-defined ACLs.
- **Match** —Criteria used to match IP addresses and /or MAC addresses with an ACL's address.The possible field values are:
  - And — Both the MAC-based and the IP-based ACL must match a packet.
  - Or — Either the MAC-based or the IP-based ACL must match a packet.
- **ACL2** — Contains a list of the user-defined ACLs.

2. Click he **Add** button. The *Add QoS Class Map Page* opens:

***Add QoS Class Map Page***




The *Add QoS Class Map Page* contains the following fields.

- **Class Map Name** — Defines a new Class Map name

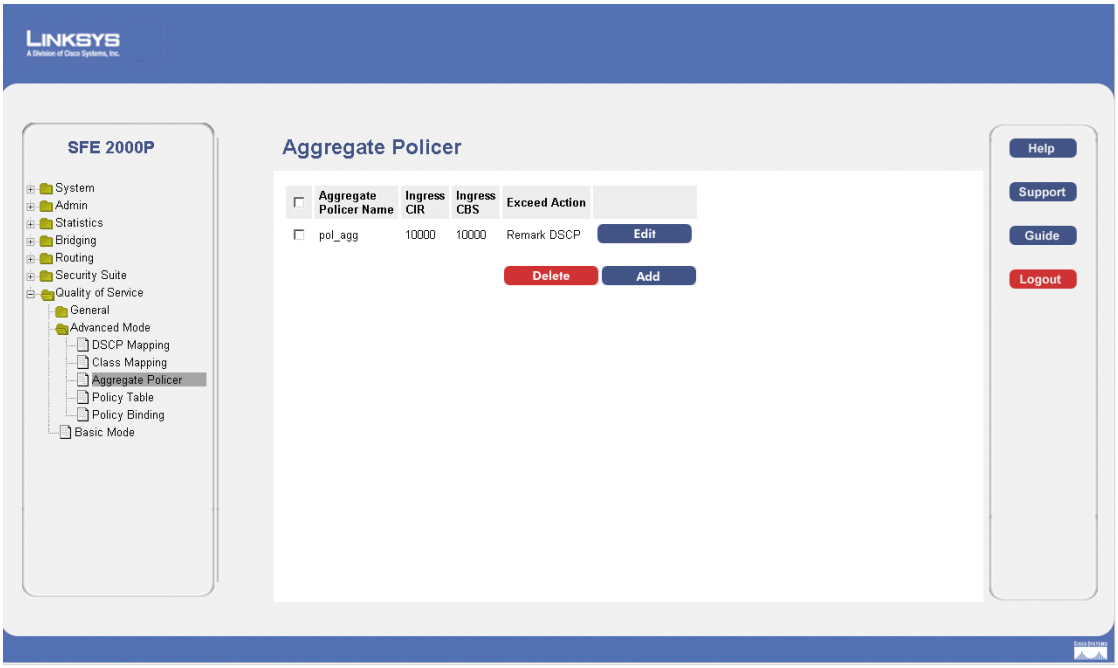
- **Preferred ACL** — Indicates if packets are first matched to an IP based ACL or a MAC based ACL. The possible field values are:
  - *IP Based ACLs* — Matches packets to IP based ACLs first, then matches packets to MAC based ACLs.
  - *MAC Based ACLs* — Matches packets to MAC based ACLs first, then matches packets to IP based ACLs.
- **IP ACL** — Matches packets to IP based ACLs first, then matches packets to MAC based ACLs.
- **Match** — Criteria used to match IP addresses and /or MAC addresses with an ACL's address.The possible field values are:
  - *And* — Both the MAC-based and the IP-based ACL must match a packet.
  - *Or* — Either the MAC-based or the IP-based ACL must match a packet.
- **MAC ACL** — Matches packets to MAC based ACLs first, then matches packets to IP based ACLs.

3. Define the relevant fields.
4. Click **Apply**. QoS mapping is added, and the device is updated.

## Defining Aggregate Policer

1. Click **Quality of Service** > **Advanced** > **Aggregate Policer**. The *Aggregate Policer Page* opens:

***Aggregate Policer Page***

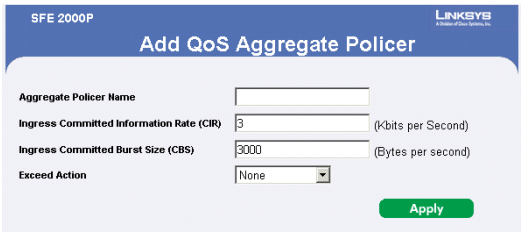



The *Aggregate Policer Page* contains the following fields.

- **Aggregate Policer Name**— Specifies the Aggregate Policer Name
- **Ingress Committed Information Rate (CIR)** — Defines the CIR in bits per second. This field is only relevant when the Police value is Single.
- **Ingress Committed Burst Size (CBS)** — Defines the CBS in bytes per second. This field is only relevant when the Police value is Single.
- **Exceed Action** — Action assigned to incoming packets exceeding the CIR. This field is only relevant when the Police value is Single. Possible values are:
  - *Drop* — Drops packets exceeding the defined CIR value.
  - *Remark DSCP* —Remarks packet's DSCP values exceeding the defined CIR value.
  - *None* **—Forwards packets exceeding the defined CIR value.**

2. Click the **Add** button. The *Add QoS Aggregate Policer Page opens:*

***Add QoS Aggregate Policer Page***




The *Add QoS Aggregate Policer Page* contains the following fields.

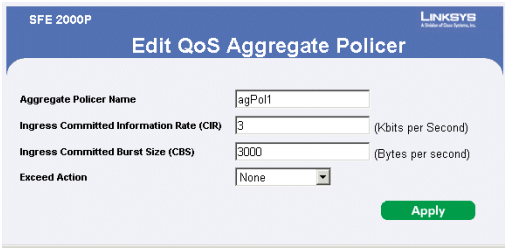
- **Aggregate Policer Name**— Specifies the Aggregate Policer Name
- **Ingress Committed Information Rate (CIR)** — Defines the CIR in bits per second. This field is only relevant when the Police value is Single.
- **Ingress Committed Burst Size (CBS)** — Defines the CBS in bytes per second. This field is only relevant when the Police value is Single.
- **Exceed Action** — Action assigned to incoming packets exceeding the CIR. This field is only relevant when the Police value is Single. Possible values are:
  - *Drop* — Drops packets exceeding the defined CIR value.
  - *Remark DSCP* —Remarks packet's DSCP values exceeding the defined CIR value.
  - *None* —Forwards packets exceeding the defined CIR value.

3. Define the relevant fields.
4. Click **Apply**. The Aggregate policer is added, and the device is updated.

*Modifying QoS Aggregate Policer*

1. Click **Quality of Service** > **Advanced** > **Aggregate Policer**. The *Aggregate Policer Page* opens:
2. Click the **Edit** Button. The *Edit QoS Aggregate Policer Page* opens:

***Edit QoS Aggregate Policer Page***




The *Edit QoS Aggregate Policer Page* contains the following fields.

- **Aggregate Policer Name**— Specifies the Aggregate Policer Name
- **Ingress Committed Information Rate (CIR)** — Defines the CIR in bits per second. This field is only relevant when the Police value is Single.
- **Ingress Committed Burst Size (CBS)** — Defines the CBS in bytes per second. This field is only relevant when the Police value is Single.
- **Exceed Action** — Action assigned to incoming packets exceeding the CIR. This field is only relevant when the Police value is Single. Possible values are:
  - *Drop* — Drops packets exceeding the defined CIR value.
  - *Remark DSCP* —Remarks packet's DSCP values exceeding the defined CIR value.
  - *None* —Forwards packets exceeding the defined CIR value.

3. Modify the relevant fields.
4. Click **Apply**. QoS aggregate policer settings are modified, and the device is updated.

## Configuring Policy Table

1. Click **Quality of Service** > **Advanced** > **Policy Table**. The *Policy Table Page* opens:

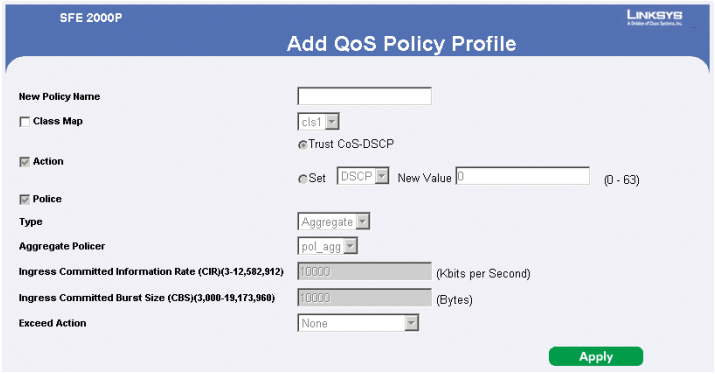
***Policy Table Page***

The *Policy Table Page* contains the following fields:

- **Policy Name**— Displays the user-defined policy name.

2. Click the **Add** button. The *Add QoS Policy Profile Page* opens:

***Add QoS Policy Profile Page***




The *Add QoS Policy Profile Page* contains the following fields.

- **New Policy Name**— Displays the user-defined policy name.
- **Class Map** — Displays the user-defined class maps which can be associated with the policy.

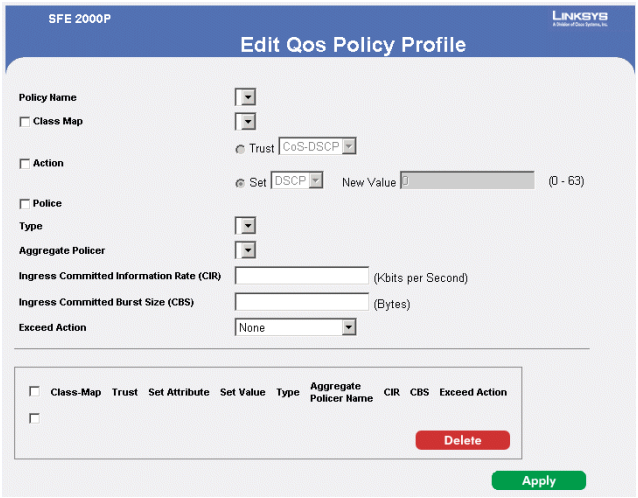
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Trust CoS-DSCP* — Enables Trust Mode for the class. This command is used to distinguish the QoS trust behavior for given traffic. When a given type is trusted, the QoS mechanism maps a packet to a queue using the received or default value and the relevant map, as defined on the QoS Settings. By designating trust, it is possible to trust only incoming traffic with certain DSCP values.
  - *Set* — Manually configures the Trust.
- **Police** — Enables Policer functionality.
- **Type** — Policer type for the policy. Possible values are:
  - *Aggregate* — Configures the class to use a configured aggregate policer selected from the drop-down menu. An aggregate policer is defined if the policer is shared with multiple classes. Traffic from two different ports can be configured for policing purposes. An aggregate policer can be applied to multiple classes in the same policy map, but cannot be used across different policy maps.
  - *Single* — Configures the class to use manually configured information rates and exceed actions.
- **Aggregate Policer** — Specifies the Aggregate Policer Name
- **Ingress Committed Information Rate (CIR)** — Defines the CIR in bits per second. This field is only relevant when the Police value is Single.
- **Ingress Committed Burst Size (CBS)** — Defines the CBS in bytes per second. This field is only relevant when the Police value is Single.
- **Exceed Action** — Action assigned to incoming packets exceeding the CIR. This field is only relevant when the Police value is Single. Possible values are:
  - *Drop* — Drops packets exceeding the defined CIR value.
  - *Remark DSCP* —Remarks packet's DSCP values exceeding the defined CIR value.
  - *None* —Forwards packets exceeding the defined CIR value.

3. Add a QoS policy profile.
4. Click **Apply**. The QoS policy profile is added, and the device is updated.

*Modifying the QoS Policy Profile*

1. Click **Quality of Service** > **Advanced** > **QoS Policy Profile**. The *Edit QoS Aggregate Policer Page* opens:

***Edit QoS Policy Profile Page***




The *Edit QoS Policy Profile Page* contains the following fields.

- **New Policy Name**— Displays the user-defined policy name.
- **Class Map** — Displays the user-defined name of the class map.
- **Action** — Defines the action attached to the rule. The possible field values are:
  - *Trust CoS-DSCP* — Enables Trust Mode for the class. This command is used to distinguish the QoS trust behavior for given traffic. When a given type is trusted, the QoS mechanism maps a packet to a queue using the received or default value and the relevant map, as defined on the QoS Settings. By designating trust, it is possible to trust only incoming traffic with certain DSCP values.
  - *Set* — Manually configures the Trust.
- **Police** — Enables Policer functionality.
- **Type** — Policer type for the policy. Possible values are:
  - *Aggregate* — Configures the class to use a configured aggregate policer selected from the drop-down menu. An aggregate policer is defined if the policer is shared with multiple classes. Traffic from two different ports can be configured for policing purposes. An aggregate policer can be applied to multiple classes in the same policy map, but cannot be used across different policy maps.
  - *Single* — Configures the class to use manually configured information rates and exceed actions.
- **Aggregate Policer** — Specifies the Aggregate Policer Name
- **Ingress Committed Information Rate (CIR)** — Defines the CIR in bits per second. This field is only relevant when the Police value is Single.

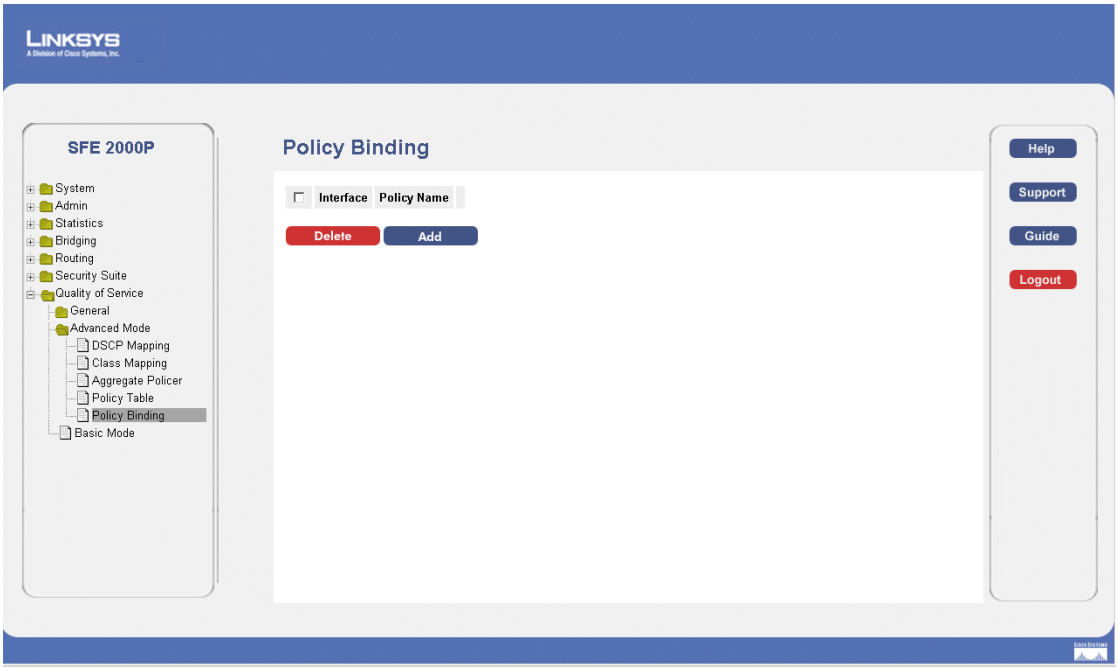
- **Ingress Committed Burst Size (CBS)** — Defines the CBS in bytes per second. This field is only relevant when the Police value is Single.
- **Exceed Action** — Action assigned to incoming packets exceeding the CIR. This field is only relevant when the Police value is Single. Possible values are:
  - *Drop* — Drops packets exceeding the defined CIR value.
  - *Remark DSCP* —Remarks packet's DSCP values exceeding the defined CIR value.
  - *None* —Forwards packets exceeding the defined CIR value.

2. Define the relevant fields.
3. Click **Apply.** The QoS policy profile is defined, and the device is updated.

## Defining Policy Binding

1. Click **Quality of Service** > **Advanced** > **Policy Binding**. The *Policy Binding Page* opens:

***Policy Binding Page***

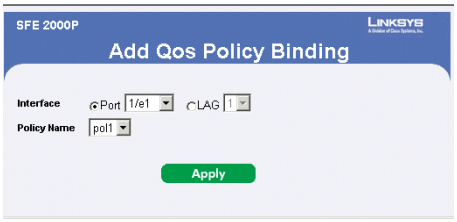



The *Policy Binding Page* contains the following fields:

- **Interface** — Displays the interface to which the entry refers.
- **Policy Name** — Displays a Policy name configured to the interface.

2. Click the **Add** button. The *Add QoS Policy Binding Page* opens:

***Add QoS Policy Binding Page***




The *Add QoS Policy Binding Page* contains the following fields.

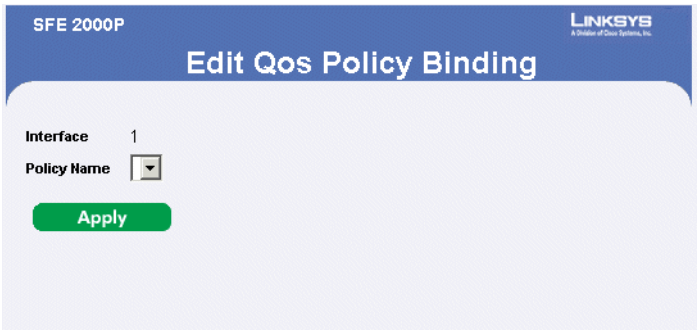
- **Interface** — Displays the interface to which the entry refers.
- **Policy Name** — Displays a Policy name configured to the interface.

3. Define the relevant fields.
4. Click **Apply**. The QoS Policy Binding is defined, and the device is updated.

*Modifying QoS Policy Binding Settings*

1. Click **Quality of Service** > **Advanced** > **Policy Binding**. The *Policy Binding Page* opens:
2. Click the **Edit** button. The *Edit QoS Policy Binding Page* opens:

***Edit QoS Policy Binding Page***




The *Edit QoS Policy Binding Page* contains the following fields.

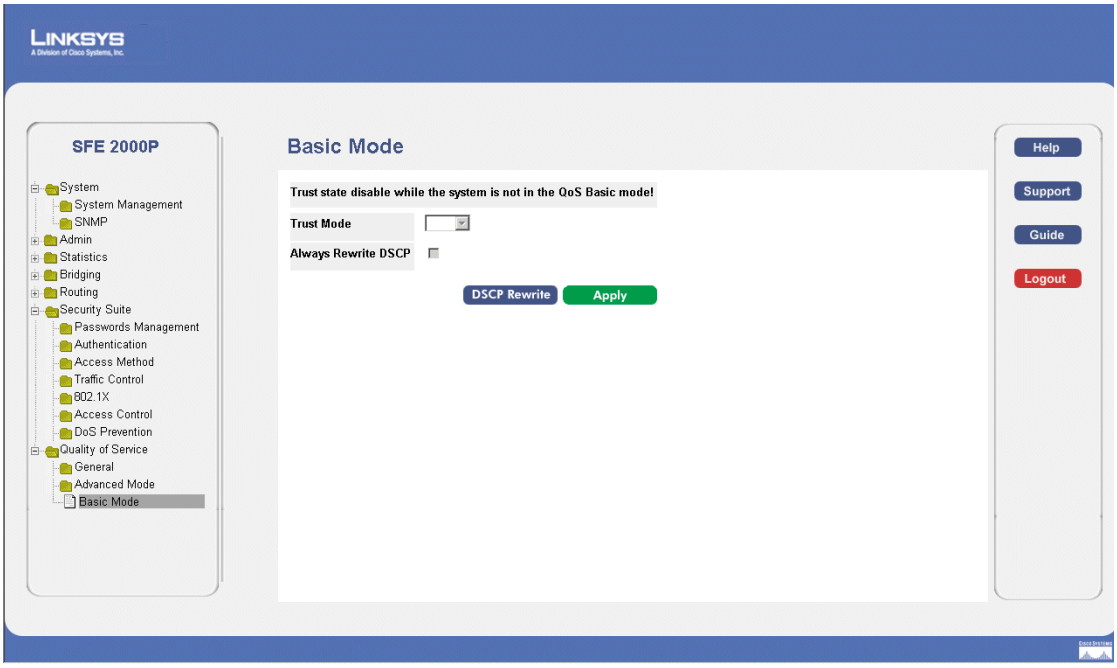
- **Interface** — Displays the interface to which the entry refers.
- **Policy Name** — Displays a Policy name configured to the interface.

3. Define the relevant fields.
4. Click **Apply**. The QoS policy binding is defined, and the device is updated.

# Defining QoS Basic Mode

1. Click **Quality of Service** > **Basic Mode**. The *Basic Mode Page* opens:

***Basic Mode Page***

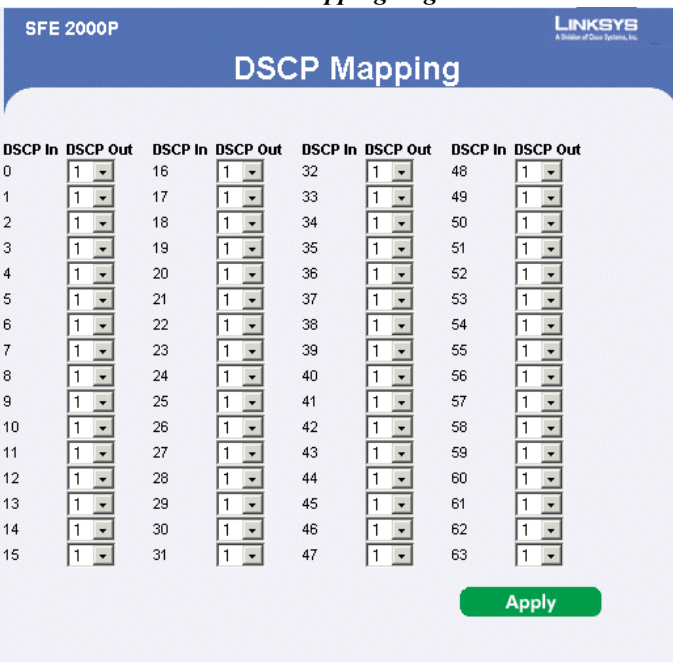



The *Basic Mode Page* contains the following fields:

- **Trust Mode** — Displays the trust mode. If a packet's CoS tag and DSCP tag, and TCP/UDP mapping are mapped to different queues, the Trust Mode determines the queue to which the packet is assigned. Possible values are:
  - *CoS* — Sets trust mode to CoS on the device. The CoS mapping determines the packet queue
  - *DSCP* — Sets trust mode to DSCP on the device. The DSCP mapping determines the packet queue.

2. Click the **DSCP Rewrite** button. The *DSCP Mapping Page* opens:

***DSCP Mapping Page***




The *DSCP Mapping Page* enables mapping DSCP values from incoming packets to DSCP values in outgoing packets. The *DSCP Mapping Page* contains the following fields:

- **DSCP In** — Indicates the Differentiated Services Code Point value in the incoming packet.
- **DSCP Out** — Indicates the Differentiated Services Code Point value in the outgoing packet.

3. Define the DSCP mappings.
4. Click **Apply**. The DSCP mappings are defined, and the device is updated.

# Managing System Files

## File Management Overview

The configuration file structure consists of the following configuration files:

- Startup Configuration File — Contains the commands required to reconfigure the device to the same settings as when the device is powered down or rebooted. The Startup file is created by copying the configuration commands from the Running Configuration file or the Backup Configuration file.
- Running Configuration File — Contains all configuration file commands, as well as all commands entered during the current session. After the device is powered down or rebooted, all commands stored in the Running Configuration file are lost. During the startup process, all commands in the Startup file are copied to the Running Configuration File and applied to the device. During the session, all new commands entered are added to the commands existing in the Running Configuration file. Commands are not overwritten. To update the Startup file, before powering down the device, the Running Configuration file must be copied to the Startup Configuration file. The next time the device is restarted, the commands are copied back into the Running Configuration file from the Startup Configuration file.
- Backup Configuration File — Contains a backup copy of the device configuration. The Backup file is generated when the Running Configuration file or the Startup file is copied to the Backup file. The commands copied into the file replaces the existing commands saved in the Backup file. The Backup file contents can be copied to either the Running configuration or the Startup Configuration files.
- Image files — Software upgrades are used when a new version file is downloaded. The file is checked for the right format, and that it is

This section contains information for defining File maintenance and includes both configuration file management as well as device access.

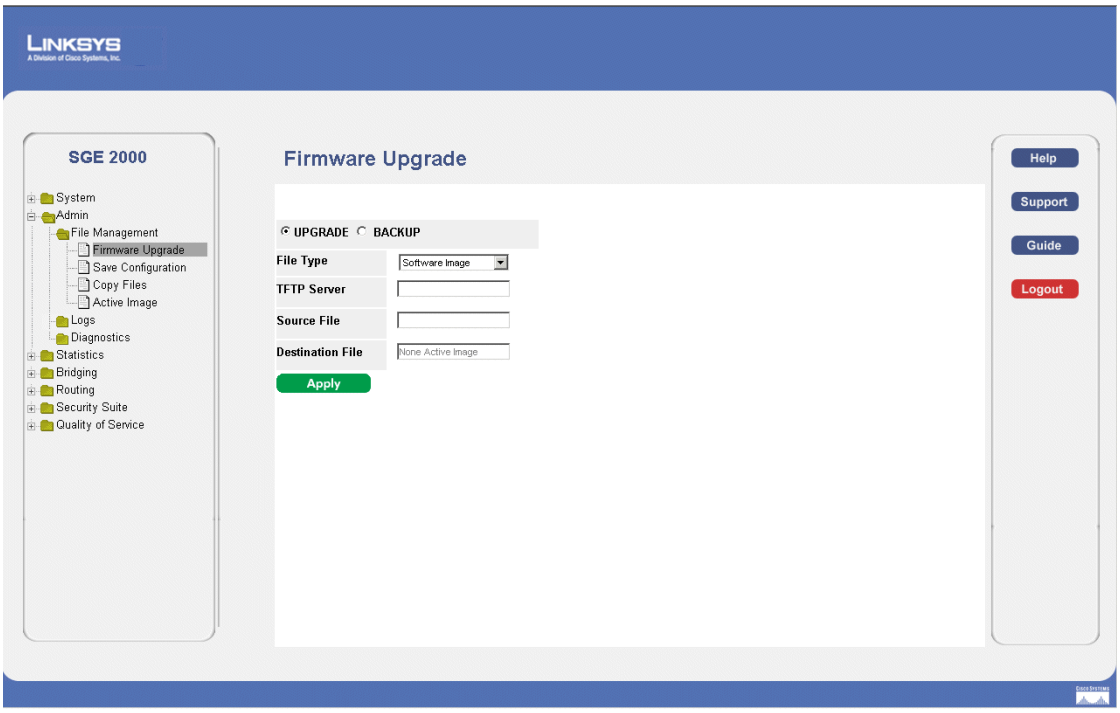
The File Management section contains the following pages:

- Firmware Upgrade
- Save Configuration
- Copy Files
- Active Image

# Firmware Upgrade

1. Click **Admin** > **File Management** > **Firmware Upgrade**. The *Firmware Upgrade Page* opens:

***Firmware Upgrade Page***




The *Firmware Upgrade Page* contains the following fields:

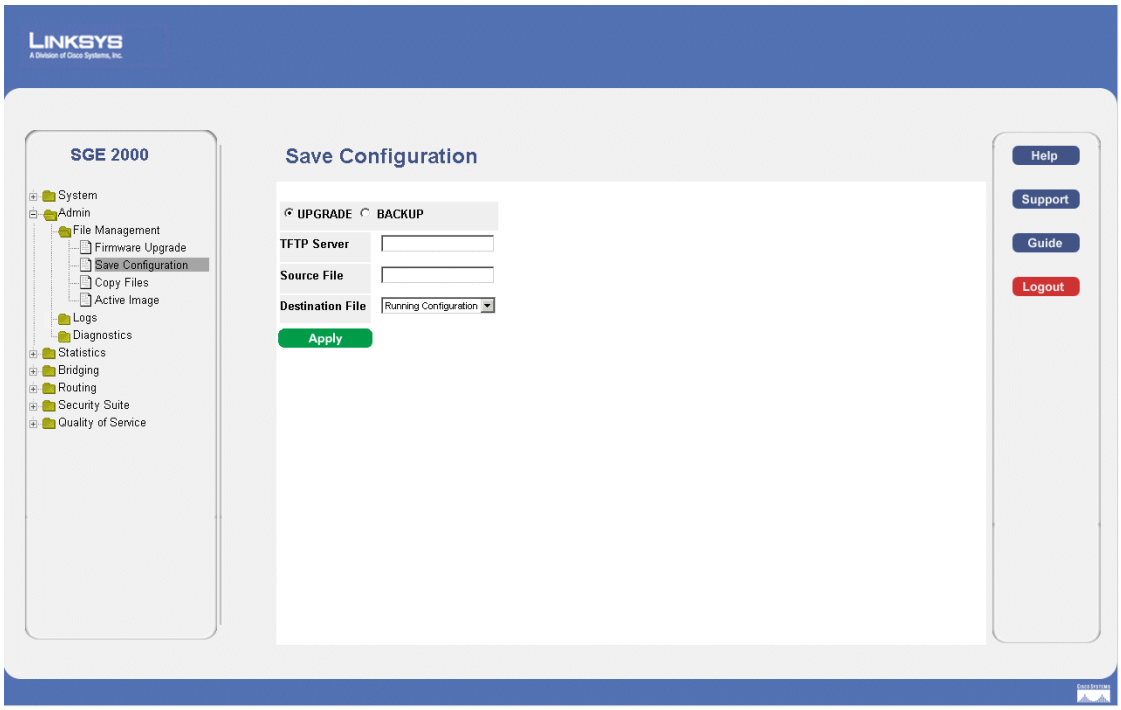
- **Upgrade** — Specifies the firmware upgrade is an upgrade function.
- **Backup** — Specifies the firmware upgrade is a backup function.
- **File Type** — Specifies the destination file type to which to the file is downloaded. The possible field values are:
  - *Software Image* — Downloads the Image file.
  - *Boot Code* — Downloads the Boot file.
- **TFTP Server** — Specifies the TFTP Server IP Address from which files are downloaded.
- **Source File** — Specifies the file to be downloaded.
- **Destination File** — Specifies the downloaded file name.

2. Define the relevant fields.
3. Click **Apply**. Firmware upgrade is defined, and the device is updated.

# Save Configuration

1. Click **Admin** > **File Management** > **Save Configuration**. The *Save Configuration Page* opens:

***Save Configuration Page***




The *Save Configuration Page* contains the following fields:

- **Upgrade** — Specifies the firmware upgrade is an upgrade function.
- **Backup** — Specifies the firmware upgrade is a backup function.
- **File Type** — Specifies the Configuration file to be saved.
- **TFTP Server** — Specifies the TFTP Server IP Address from which file is downloaded.
- **Source File** — Specifies the file to be downloaded.
- **Destination File**— Specifies the saved file name.

2. Define the relevant files.
3. Click **Apply**. The save configuration is defined, and the device is updated.

# Copy Files

All software images on the stack must be identical to ensure proper operation of the stack. There are two different ways to update images across the stack:

- Image can be updated prior to connecting a unit to the stack. (This is the recommended method.)
- Upgrade master and copy master image to units across the stack.

These steps can be done from the Menu-Based CLI or from the web interface.

a. Copy image from TFTP to master

b. Change active image on master

c. Reboot master

d. Copy from master to rest of units

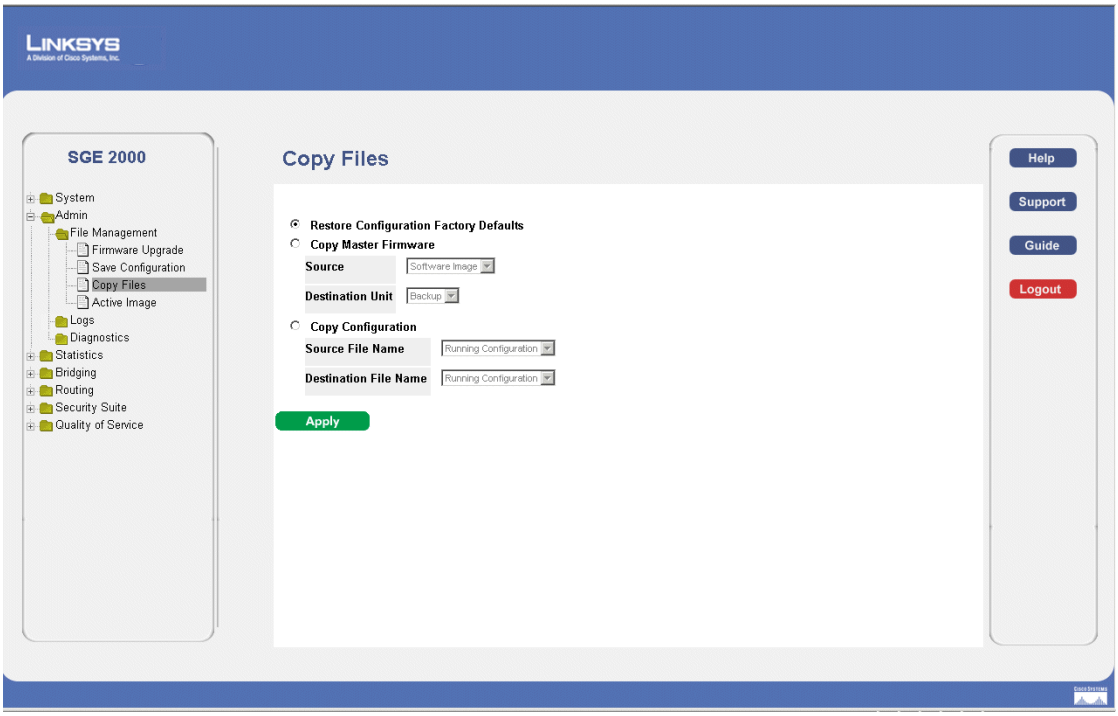
e. Change active of rest of units

f. Reload only rest of units and not master.

**NOTE:** If there is a backup master in the stack, it takes over as master of the stack following step (c) above. In such a case steps (a) - (c) should be run on the (old backup) new master unit.

1. Click **Admin** > **File Management** > **Copy Files**. The *Copy Files Page* opens:

***Copy Files Page***




The *Copy Files Page* contains the following fields:

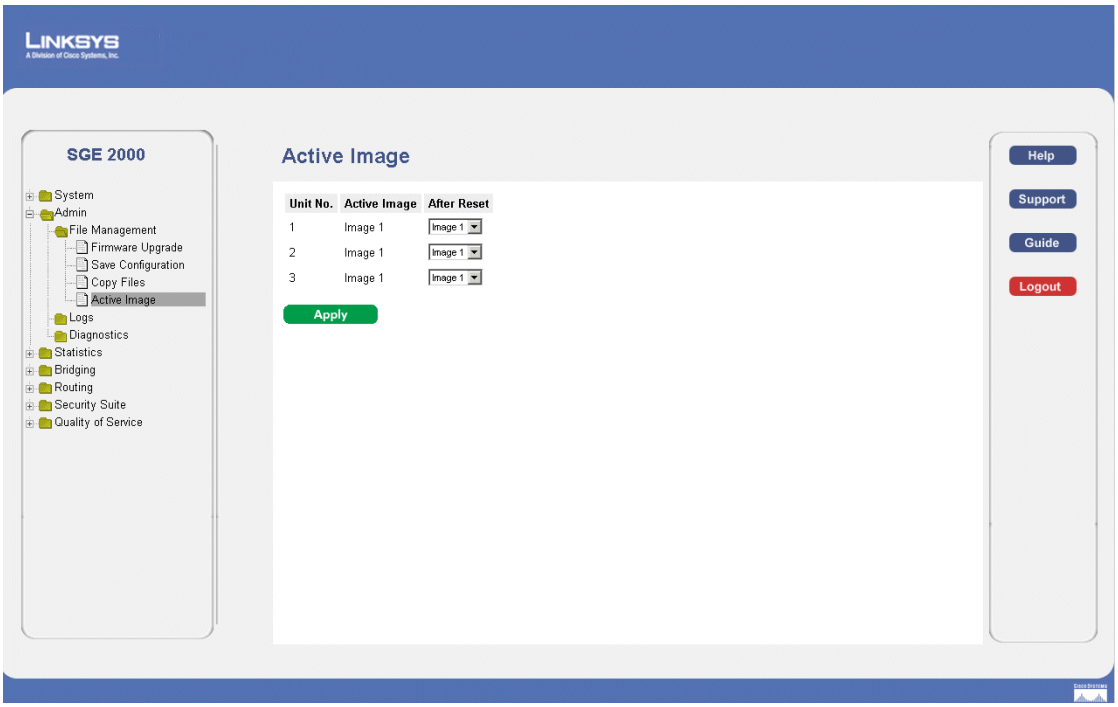
- **Restore Configuration Factory Defaults** — Resets the Configuration file to the factory defaults. The factory defaults are reset after the device is reset. When not selected, the device maintains the current Configuration file.
- **Copy Master Firmware**— Indicates the Stacking Master configuration file to copy. The possible field values are:
  - *Source* — Copies the current Stacking Master's firmware.
  - *Destination Unit* — Defines the stacking member to which the firmware is downloaded.
- **Copy Configuration** — Indicates the device configuration to be copied.
- **Source File Name** — Indicates the configuration file copied.
  - *Destination File Name* — Defines the stacking member to which the configuration file is downloaded.

2. Define the relevant fields.
3. Click **Apply.** Copy Files is configured, and the device is updated.

# Active Image

1. Click **Admin** > **File Management** > **Active Image**. The *Active Image Page* opens:

***Active Image Page***




The *Active Image Page* contains the following fields:

- **Unit No.** — Indicates the unit number for which the Image file is selected.
- **Active Image** — Indicates the Image file which is currently active on the unit.
- **After Reset** — The Image file which is active on the unit after the device is reset. The possible field values are:
  - *Image 1* — Activates Image file 1 after the device is reset.
  - *Image 2* — Activates Image file 2 after the device is reset.

2. Define the relevant fields.
3. Click **Apply**. Active image is define, and the device is updated.

# Managing System Logs

The System Logs enable viewing device events in real time, and recording the events for later usage. System Logs record and manage events and report errors or informational messages.

Event messages have a unique format, as per the SYSLOG protocols recommended message format for all error reporting. For example, Syslog and local device reporting messages are assigned a severity code, and include a message mnemonic, which identifies the source application generating the message. It allows messages to be filtered based on their urgency or relevancy. Each message severity determines the set of event logging devices that are sent per each event logging.

This section contains the following pages:

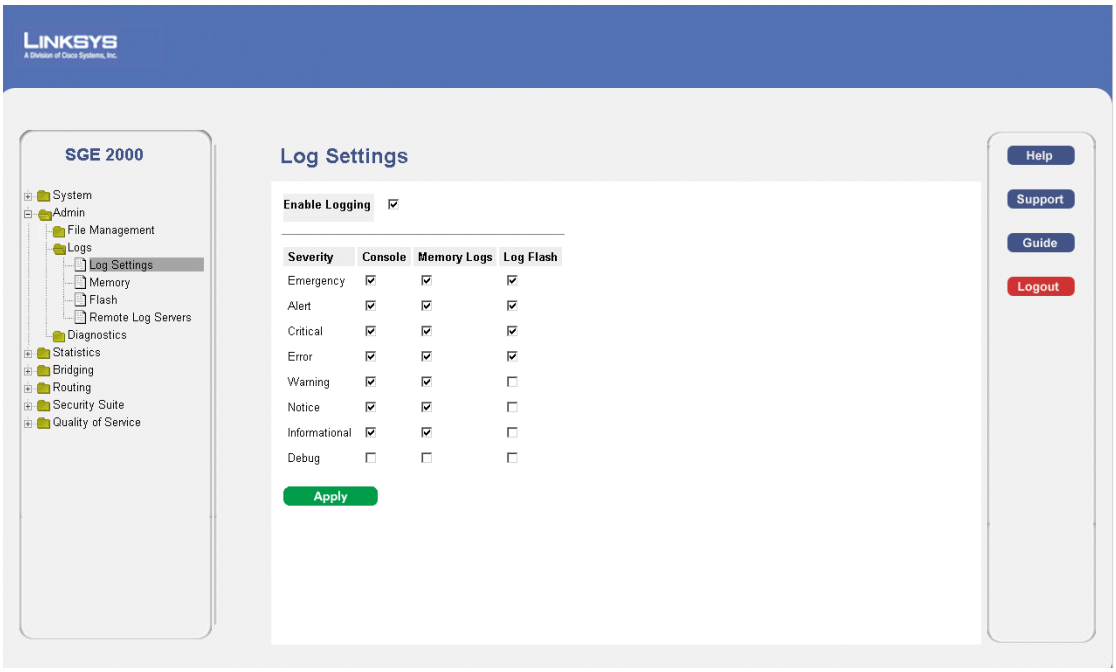
- Enabling System Logs
- Viewing the Device Memory Logs
- Viewing the Flash Logs
- Viewing Remote Logs

## Enabling System Logs

The *Log Settings Page* contains fields for defining which events are recorded to which logs. It contains fields for enabling logs globally, and parameters for defining logs. The Severity log messages are listed from the highest severity to the lowest. To define Log Global Parameters:

1. Click **Admin > Logs > Logs Settings**. The *Log Settings Page* opens.

***Log Settings Page***




The *Log Settings Page* contains the following fields:

- **Enable Logging** — Indicates if device global logs for Console, Memory Logs, and Log Flash.
- **Severity** — The following are the available severity logs:
  - *Emergency* —The system is not functioning.
  - *Alert* — The system needs immediate attention.
  - *Critical* — The system is in a critical state.
  - *Error* — A system error has occurred.
  - *Warning* — A system warning has occurred.
  - *Notice* — The system is functioning properly, but system notice has occurred.
  - *Informational* — Provides device information.
  - *Debug* — Provides detailed information about the log. If a Debug error occurs, contact Customer Tech Support.
- **Console** — Provides information about logs saved to the console.
- **Memory Logs** — Defines all system logs in a chronological order that are saved in RAM (Cache)
- **Log Flash —** Defines the minimum severity level from which logs are sent to the Message Log kept in FLASH memory.

2. Define the relevant fields.

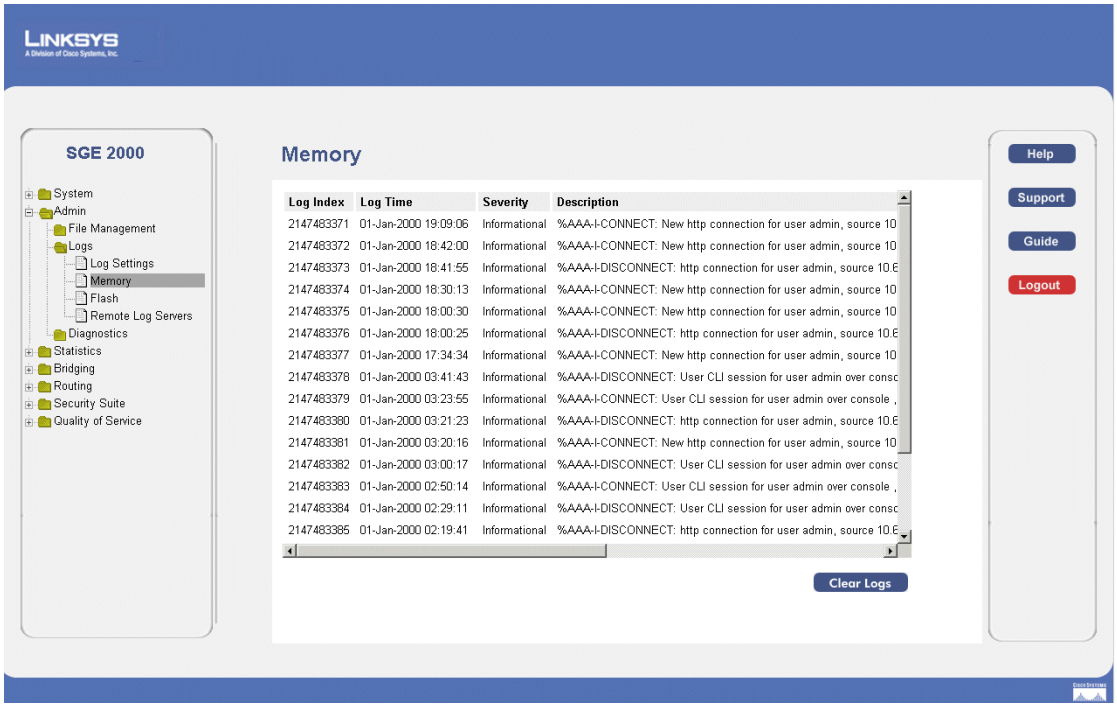
3. Click **Apply**. The global log parameters are set, and the device is updated.

# Viewing the Device Memory Logs

The *Memory Log Page* contains all system logs in a chronological order that are saved in RAM (Cache). To open the *Memory Page:*

1. Click **Admin > Logs > Memory**. The *Memory Page* opens.

***Memory Page***




The *Memory Page* contains all system logs in a chronological order that are saved in RAM (Cache).The *Memory Page* contains the following fields:

- **Log Index** — Displays the log number.
- **Log Time** — Displays the time at which the log was generated.
- **Severity** — Displays the log severity.
- **Description** — Displays the log message text.

## Clearing Message Logs

Message Logs can be cleared from the *FLASH Log Page*. To clear the *FLASH Log Page*:

1. Click **Admin > Logs > Memory**. The *Memory Page* opens.

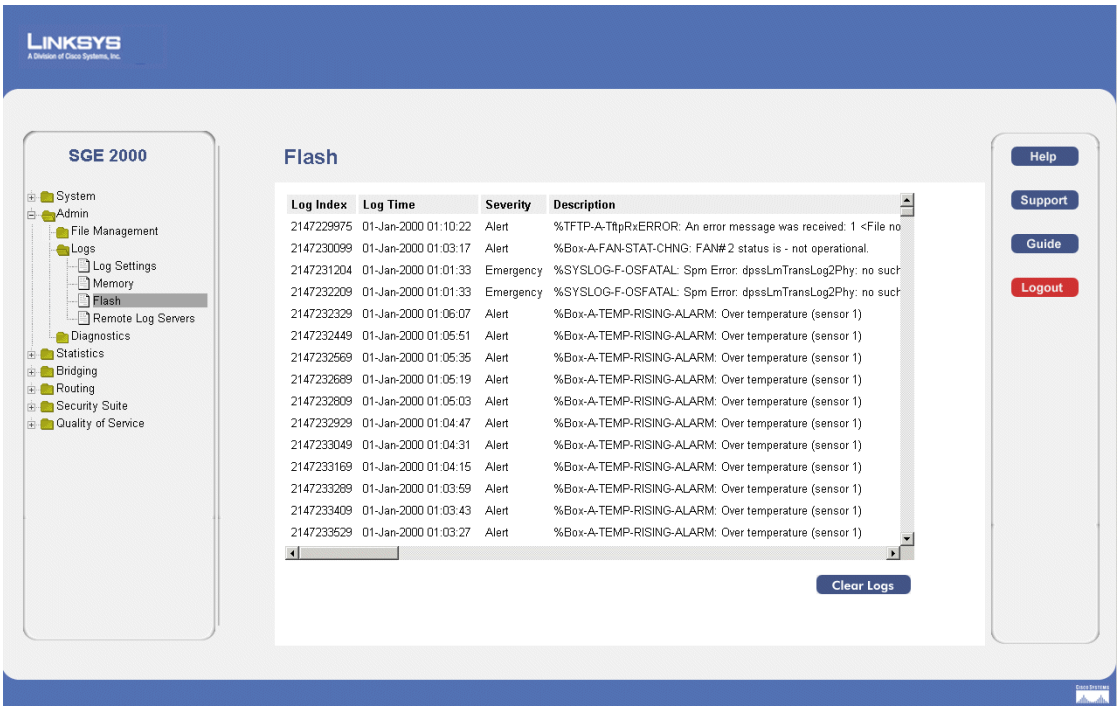
2. Click the **Clear Logs button.** The message logs are cleared.

## Viewing the Flash Logs

The *Flash Page* contains information about log entries saved to the Log File in FLASH, including the time the log was generated, the log severity, and a description of the log message. The Message Log is available after reboot. To view the Flash Logs:

1. Click **Admin** > **Logs** > **Flash**. The *Flash Page* opens:

***Flash Page***




The *Flash Page* contains the following fields:

- **Log Index** — Displays the log number.
- **Log Time** — Displays the time at which the log was generated.
- **Severity** — Displays the log severity.
- **Description** — Displays the log message text.

## Clearing Message Logs

Message Logs can be cleared from the *FLASH Log Page*. To clear the Flash Page:

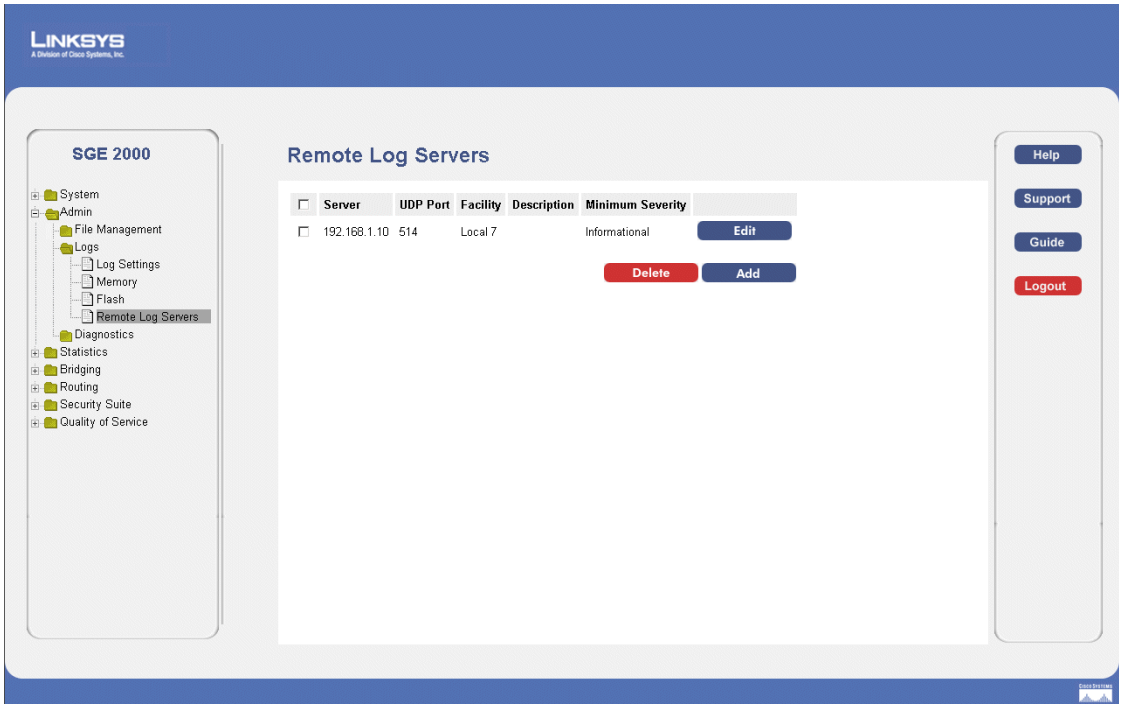
1. Click **Admin > Logs > FLASH**. The *Flash Page* opens.
2. Click **Clear Logs**. The message logs are cleared.

## Viewing Remote Logs

The *Remote Log Servers Page* contains information for viewing and configuring the Remote Log Servers. New log servers can be defined, and the log severity sent to each server.

1. Click **Admin** > **Logs** > **Remote Log Servers**. The *Remote Log Servers Page* opens:

***Remote Log Servers Page***

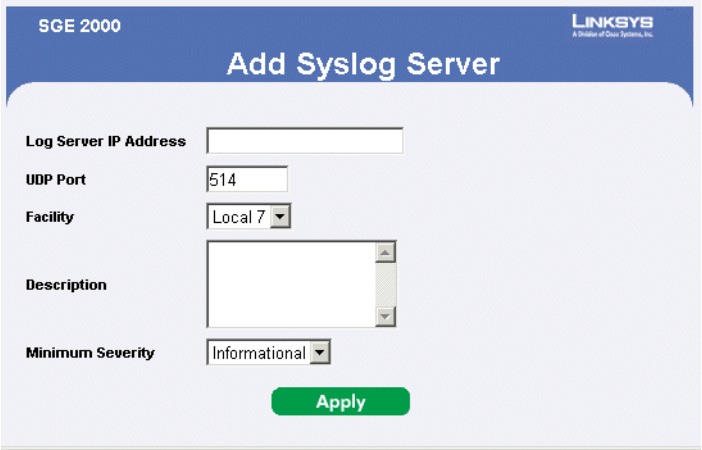



The *Remote Log Servers Page* contains the following fields:

- **Server** — Specifies the server IP address to which logs can be sent.
- **UDP Port** — Defines the UDP port to which the server logs are sent. The possible range is 1 to 65535. The default value is 514.
- **Facility** — Defines a user-defined application from which system logs are sent to the remote server. Only one facility can be assigned to a single server. If a second facility level is assigned, the first facility is overridden. All applications defined for a device utilize the same facility on a server. The field default is Local 7. The possible field values are **Local 0 - Local 7.**
- **Description** — Provides a user-defined server description.
- **Minimum Severity** — Indicates the minimum severity from which logs are sent to the server. For example, if Notice is selected, all logs from a Notice severity and higher are sent to the remote server.

2. Click the **Add** button. The *Add Syslog Server Page* opens:

*Add Syslog Server Page*




The *Add Syslog Server Page* contains information for viewing and configuring the Remote Log Servers. New log servers can be defined, and the log severity sent to each server.

The *Add Syslog Server Page* contains the following fields:

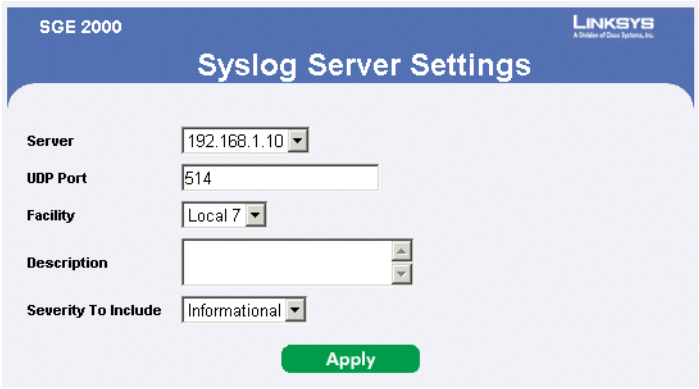
- **Log Server IP Address** — Specifies the server to which logs can be sent.
- **UDP Port** — Defines the UDP port to which the server logs are sent. The possible range is 1 to 65535. The default value is 514.
- **Facility** — Defines a user-defined application from which system logs are sent to the remote server. Only one facility can be assigned to a single server. If a second facility level is assigned, the first facility is overridden. All applications defined for a device utilize the same facility on a server. The field default is Local 7. The possible field values are **Local 0 - Local 7.**
- **Description** — Provides a user-defined server description.
- **Minimum Severity** — Indicates the minimum severity from which logs are sent to the server. For example, if Notice is selected, all logs from a Notice severity and higher are sent to the remote server.

3. Define the relevant fields.
4. Click **Apply.** The *Add Syslog Server Page* closes, the syslog server is added, and the device is updated.

*Modify Syslog Server Settings*

1. Click **Admin** > **Logs** > **Remote Log Servers**. The *Remote Log Servers Page* opens:
2. Click the **Edit** button. The *Syslog Server Settings Page* opens:

***Syslog Server Settings Page***




The *Syslog Server Settings Page* contains the following fields:

- **Server** — Specifies the server to which logs can be sent.
- **UDP Port (1-65535)** — Defines the UDP port to which the server logs are sent. The possible range is 1 to 65535. The default value is 514.
- **Facility** — Defines a user-defined application from which system logs are sent to the remote server. Only one facility can be assigned to a single server. If a second facility level is assigned, the first facility is overridden. All applications defined for a device utilize the same facility on a server. The field default is Local 7. The possible field values are **Local 0 - Local 7.**
- **Description** — Provides a user-defined server description.
- **Severity to Include** — Indicates the minimum severity from which logs are sent to the server. For example, if Notice is selected, all logs from a Notice severity and higher are sent to the remote server.

3. Define the relevant fields.
4. Click **Apply**. The Syslog Server settings are modified, and the device is updated.

# Configuring System Time

The device supports the Simple Network Time Protocol (SNTP). SNTP assures accurate network device clock time synchronization up to the millisecond. Time synchronization is performed by a network SNTP server. The device operates only as an SNTP client, and cannot provide time services to other systems.

This section provides information for configuring different system time aspects, including:

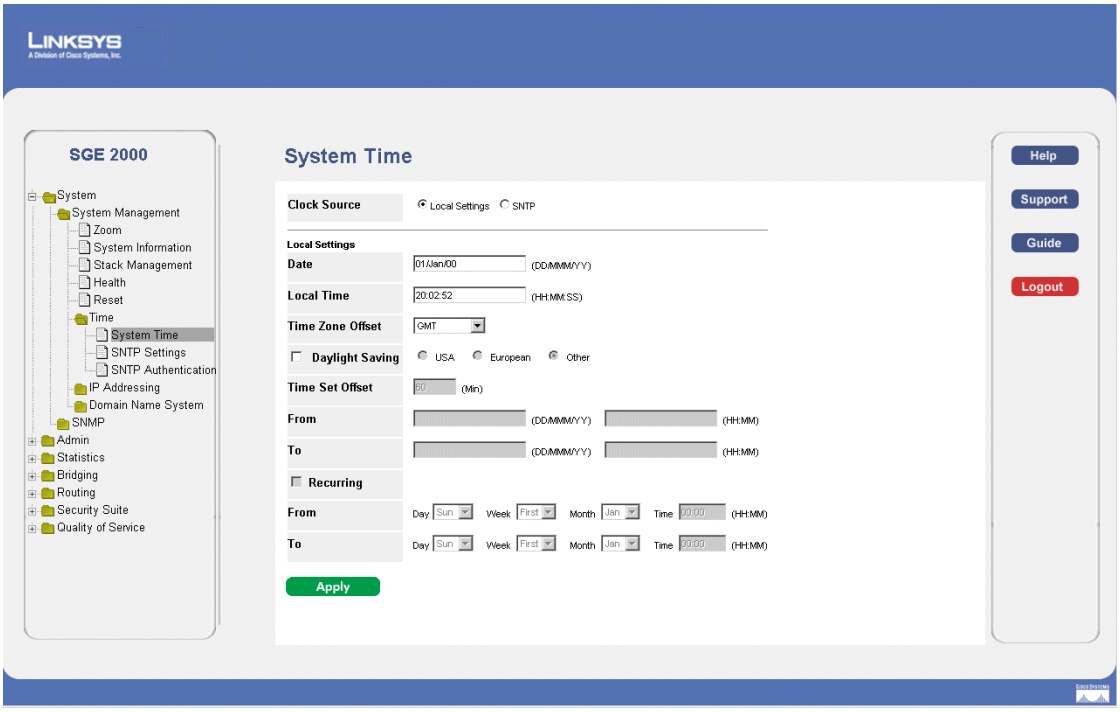
- Defining System Time
- Defining SNTP Settings
- Defining SNTP Authentication

# Defining System Time

The *System Time Page* contains fields for defining system time parameters for both the local hardware clock, and the external SNTP clock. If the system time is kept using an external SNTP clock, and the external SNTP clock fails, the system time reverts to the local hardware clock. Daylight Savings Time can be enabled on the device. To define system time:

1. Click **System** > **System Management** > **Time** > **System Time**. The *System Time Page* opens:

***System Time Page***




The *System Time Page* contains the following fields:

- **Clock Source —** Indicates the source used to set the system clock. The possible field values:
  - *SNTP* — Sets the system time is set via an SNTP server.
  - *Local Settings* — Sets that the system time is not set by an external source. This is the default value.
- **Date —** Indicates the system date. The field format is Day:Month:Year, for example, 04 May 2050.
- **Local Time —** Indicates the system time. The field format is HH:MM:SS, for example, 21:15:03.
- **Time Zone Offset —** Indicates the difference between *Greenwich Mean Time* (GMT) and local time. For example, the Time Zone Offset for Paris is GMT +1, while the local time in New York is GMT –5. There are two types of daylight settings, either by a specific date in a particular year or a recurring setting irrespective of the year. For a specific setting in a particular year complete the *Daylight Savings* area, and for a recurring setting, complete the *Recurring* area.

- **Daylight Savings —** Enables the Daylight Savings Time (DST) on the device based on the devices location. The possible field values are:
  - *USA* — The device switches to DST at 2 a.m. on the first Sunday of April, and reverts to standard time at 2 a.m. on the last Sunday of October.
  - *European* — The device switches to DST at 1:00 am on the last Sunday in March and reverts to standard time at 1:00 am on the last Sunday in October. The *European* option applies to EU members, and other European countries using the EU standard.
  - *Other* — The DST definitions are user-defined based on the device locality. If Other is selected, the *From* and *To* fields must be defined.
- **Time Set Offset (1-1440) —** For non USA and European countries, Indicates the amount of time for DST can be set in minutes. The default time is 60 minutes. Day:Month:Year in one field and time in another. For example, DST begins on the 25th October 2007 5:00 am, the two fields will be 25Oct07 and 5:00. The possible field values are:
  - *Date* — The date at which DST begins. The possible field range is 1-31.
  - *Month* — The month of the year in which DST begins. The possible field range is Jan-Dec.
  - *Year* — The year in which the configured DST begins.
  - *Time* — The time at which DST begins. The field format is Hour:Minute, for example, 05:30.
- **To —** Indicates the time that DST ends in countries other than USA or Europe in the format DayMonthYear in one field and time in another. For example, DST ends on the 23rd March 2008 12:00 am, the two fields will be 23Mar08 and 12:00. The possible field values are:
  - *Date* — The date at which DST ends. The possible field range is 1-31.
  - *Month* — The month of the year in which DST ends. The possible field range is Jan-Dec.
  - *Year*— The year in which the configured DST ends.
  - *Time* — The time at which DST starts. The field format is Hour:Minute, for example, 05:30.
- **Recurring —** Indicates the time that DST starts in countries other than USA or European where the DST is constant year to year. The possible field values are:
- **From —** Indicates the time that DST begins each year. For example, DST begins locally every second Sunday in April at 5:00 am. The possible field values are:
  - *Day* — The day of the week from which DST begins every year. The possible field range is Sunday-Saturday.
  - *Week* — The week within the month from which DST begins every year. The possible field range is 1-5.
  - *Month* — The month of the year in which DST begins every year. The possible field range is Jan.-Dec.

- *Time* — The time at which DST begins every year. The field format is Hour:Minute, for example, 02:10.

- **To —** Indicates the recurring time that DST ends each year. For example, DST ends locally every fourth Friday in October at 5:00 am. The possible field values are:
  - *Day* — The day of the week at which DST ends every year. The possible field range is Sunday-Saturday.
  - *Week* — The week within the month at which DST ends every year. The possible field range is 1-5.
  - *Month* — The month of the year in which DST ends every year. The possible field range is Jan.-Dec.
  - *Time* — The time at which DST ends every year. The field format is Hour:Minute, for example, 05:30.

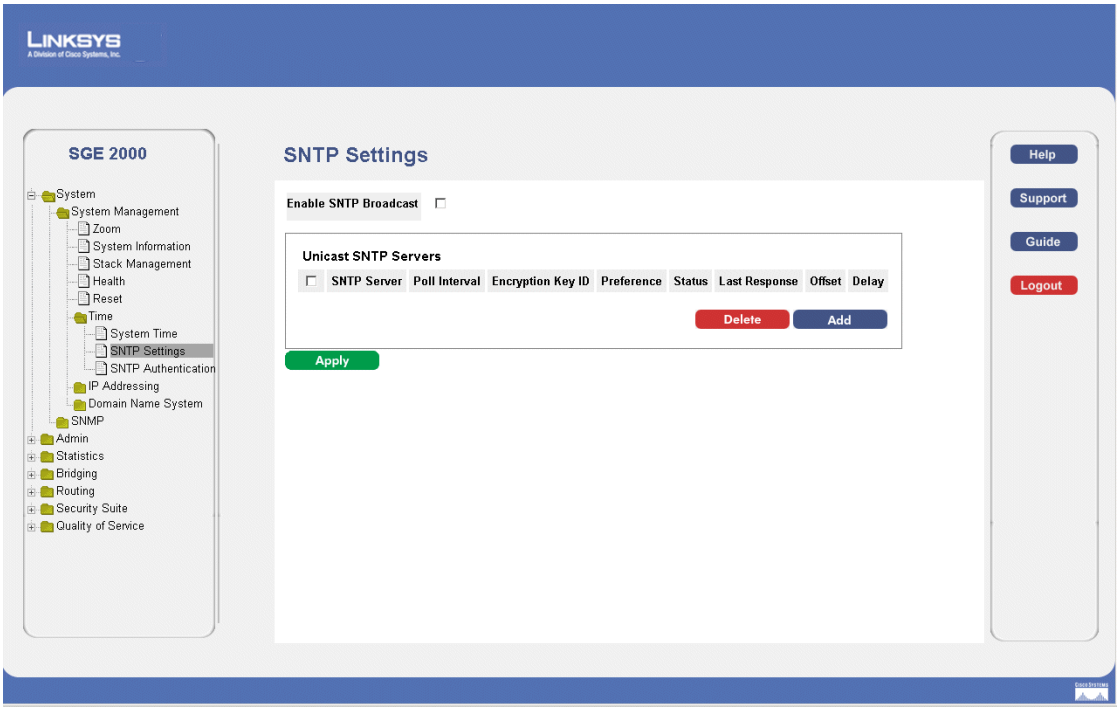
2. Define the relevant fields.
3. Click **Apply**. The Time Settings are defined, and the device is updated.

## Defining SNTP Settings

The *SNTP Settings Page* provides information for defining SNTP parameters globally. To define SNTP global parameters:

1. Click **System** > **System Management** > **Time** > **SNTP Settings**. The *SNTP Settings Page* opens:

***SNTP Settings Page***




The *SNTP Settings Page* contains the following fields:

- **Enable SNTP Broadcast** — Enables polling the selected SNTP Server for system time information, when enabled.
- **SNTP Server** — Indicates the user-defined SNTP server IP address. Up to eight SNTP servers can be defined
- **Poll Interval** — Defines the interval (in seconds) at which the SNTP server is polled for Unicast information. By default, the poll interval is 1024 seconds.
- **Encryption Key ID** — Indicates the Key Identification used to communicate between the SNTP server and device. The range is 1 - 4294967295
- **Preference** — The SNTP server providing SNTP system time information. The possible field values are:
  - *Primary* — The primary server provides SNTP information.
  - *Secondary* — The backup server provides SNTP information.
  - *In progress* — The SNTP server is currently sending or receiving SNTP information.
  - *Unknown* — The progress of the SNTP information currently being sent is unknown. For example, the device is currently looking for an interface.
- **Status** — The operating SNTP server status. The possible field values are:
  - *Up* — The SNTP server is currently operating normally.
  - *Down* — Indicates that a SNTP server is currently not available. For example, the SNTP server is currently not connected or is currently down.
- **Last Response** — Indicates the last time a response was received from the SNTP server.
- **Offset** — Indicates the Timestamp difference between the device local clock and the acquired time from the SNTP server.
- **Delay** — Indicates the amount of time it takes to reach the SNTP server.

2. Click the **Add** button. The *Add SNTP Server Page* opens:

*Add SNTP Server Page*

The *Add SNTP Server Page* contains the following fields:

- **SNTP Server** — Defines user-defined SNTP server IP address.
- **Enable Poll Interval** — Indicates whether or not the device polls the selected SNTP server for system time information.
- **Encryption Key ID** — Indicates the Key Identification used to communicate between the SNTP server and device. The range is 1 - 4294967295

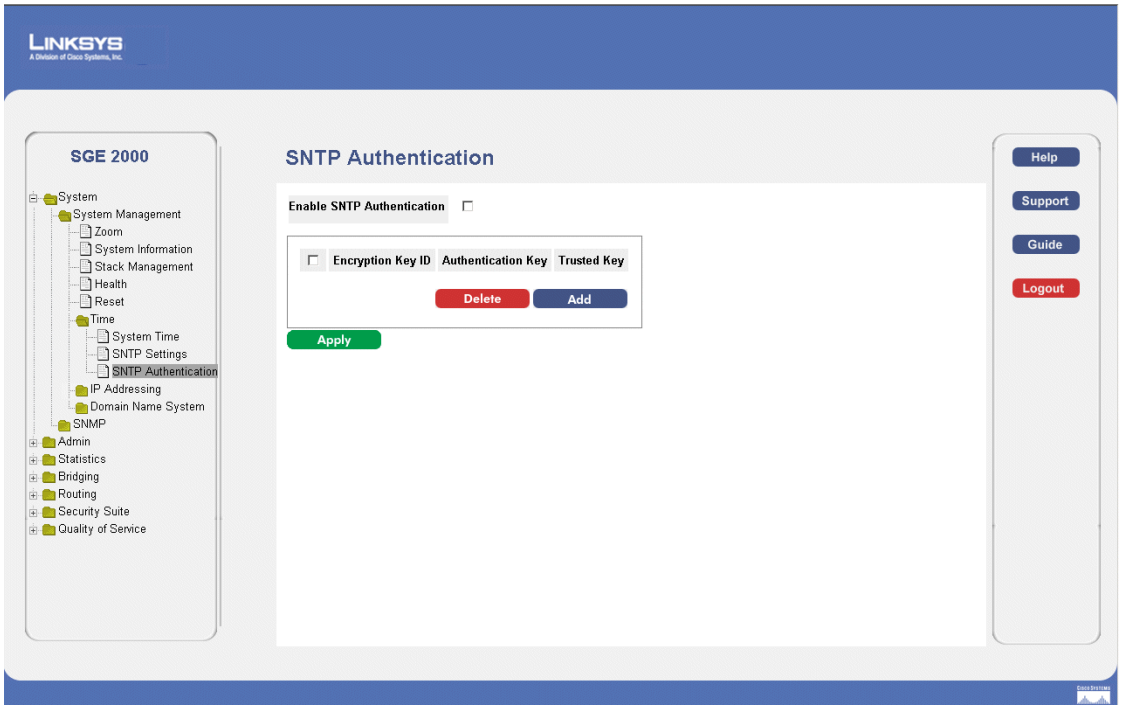
3. Define the relevant fields.
4. Click **Apply**. The SNTP Server is added, and the device is updated.

## Defining SNTP Authentication

The *SNTP Authentication Page* provides parameters for defining the means by which the SNTP server is authenticated.

1. Click **System** > **System Management** > **Time** > **SNTP Authentication**. The *SNTP Authentication Page* opens:

*SNTP Authentication Page*

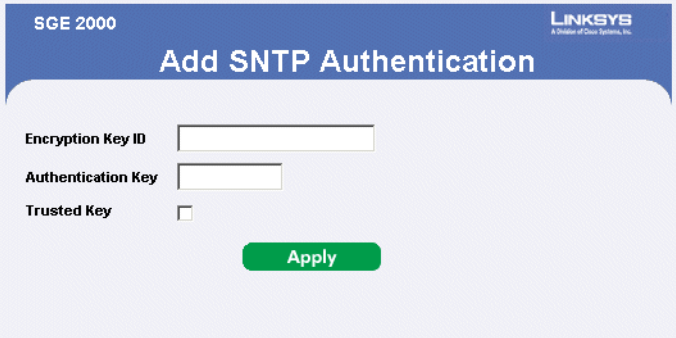



The *SNTP Authentication Page* contains the following fields:

- **Enable SNTP Authentication** — Indicates if authenticating an SNTP session between the device and an SNTP server is enabled on the device. The possible field values are:
  - *Checked* — Authenticates SNTP sessions between the device and SNTP server.
  - *Unchecked* — Disables authenticating SNTP sessions between the device and SNTP server.
- **Encryption Key ID** — Defines the Key Identification used to authenticate the SNTP server and device. The field value is up to 4294967295 characters.
- **Authentication Key** — Displays the key used for authentication.
- **Trusted Key** — Indicates the encryption key used (Unicast/Anycast) or elected (Broadcast) to authenticate the SNTP server.

2. Click the **Add** button. The *Add SNTP Authentication Page* opens:

***Add SNTP Authentication Page***




The *Add SNTP Authentication Page* contains the following fields:

- **Encryption Key ID** — Defines the Key Identification used to authenticate the SNTP server and device. The field value is up to 4294967295 characters.
- **Authentication Key** — Displays the key used for authentication.
- **Trusted Key** — Indicates the encryption key used (Unicast/Anycast) or elected (Broadcast) to authenticate the SNTP server.

3. Define the relevant fields.
4. Click **Apply**. The SNTP Authentication is defined, and the device is updated.

# Viewing Statistics

This section provides device statistics for RMON, interfaces, GVRP, EAP, and Etherlike statistics. This section contains the following topics:

- Viewing Ethernet Statistics
- Managing RMON Statistics

## Viewing Ethernet Statistics

The Ethernet section contains the following pages:

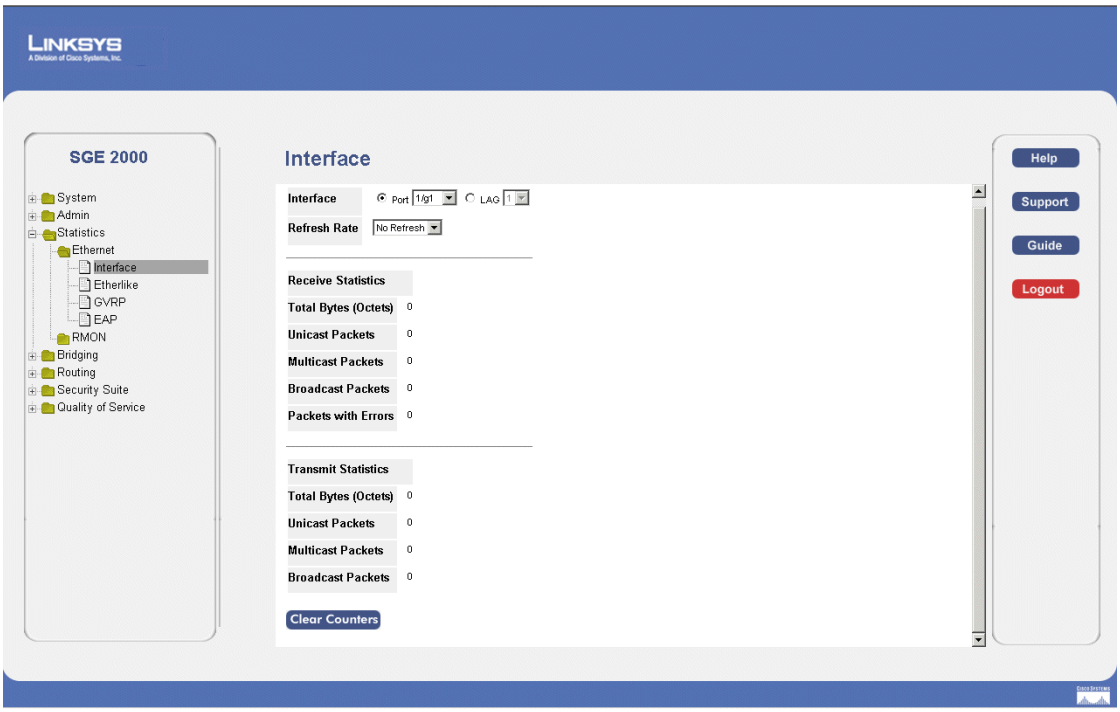
- Defining Ethernet Interface
- Viewing Etherlike Statistics
- Viewing GVRP Statistics
- Viewing EAP Statistics

### Defining Ethernet Interface

The *Interface Page* contains statistics for both received and transmitted packets. The *Interface Page* is divided into three areas, General Information, Receive Statistics and Transmit Statistics.

1. Click **Statistics** > **Ethernet** > **Interface**. The *Interface Page* opens:

***Interface Page***




The *Interface Page* contains the following fields:

The General Information area contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port* — Defines the specific port for which Ethernet statistics are displayed.
  - *LAG* — Defines the specific LAG for which Ethernet statistics are displayed.
- **Refresh Rate** — Defines the amount of time that passes before the interface statistics are refreshed. The possible field values are:
  - *15 Sec* — Indicates that the Ethernet statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the Ethernet statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the Ethernet statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the Ethernet statistics are not refreshed.

The Receive Statistics area contains the following fields:

- **Total Bytes (octets)** — Displays the number of octets received on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Unicast Packets** — Displays the number of good Unicast packets received on the interface since the device was last refreshed.

- **Multicast Packets** — Displays the number of good Multicast packets received on the interface since the device was last refreshed.
- **Broadcast Packets** — Displays the number of good broadcast packets received on the interface since the device was last refreshed.
- **Packets with Errors** — Displays the number of packets with errors.

The Transmit Statistics area contains the following fields:

- **Total Bytes (octets)** — Displays the number of octets transmitted on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Unicast Packets** — Displays the number of good Unicast packets transmitted on the interface since the device was last refreshed.
- **Multicast Packets** — Displays the number of good Multicast packets transmitted on the interface since the device was last refreshed.
- **Broadcast Packets** — Displays the number of good broadcast packets transmitted on the interface since the device was last refreshed.

### Resetting Interface Statistics Counters

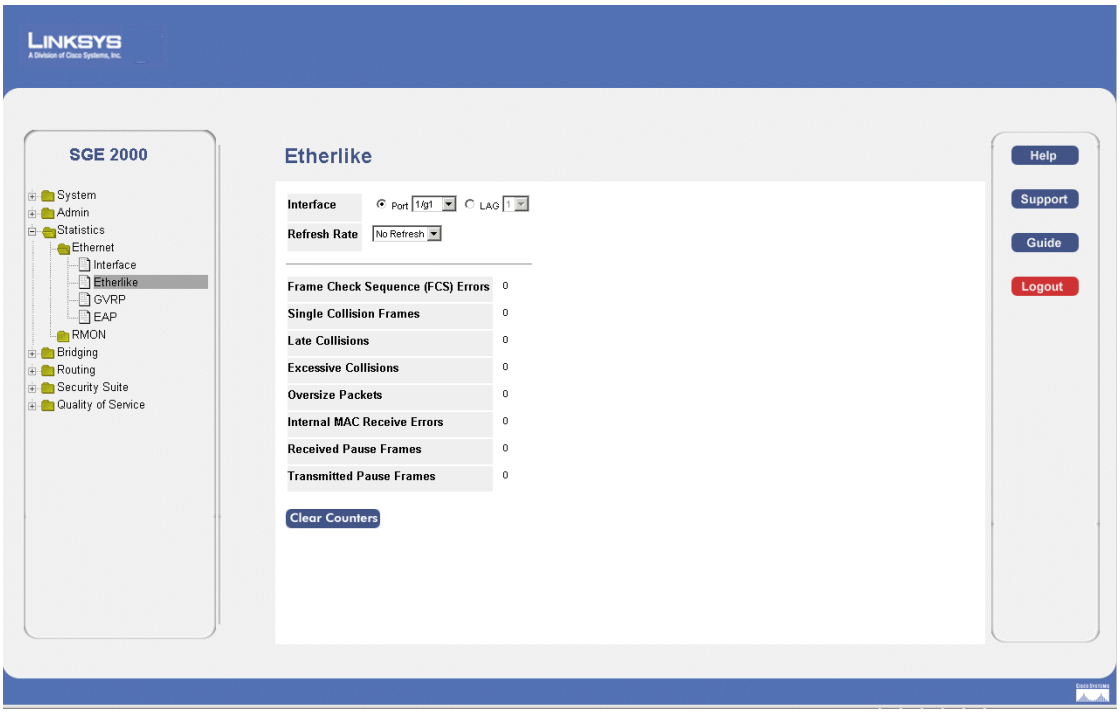
1. Click **Statistics** > **Ethernet** > **Interface**. The *Interface Page* opens:
2. Click the **Clear Counters** button. The interface statistics counters are cleared.

## Viewing Etherlike Statistics

The *Etherlike Page* contains interface statistics. To view Etherlike Statistics:

1. Click **Statistics** > **Ethernet** >**Etherlike**. The *Etherlike Page* opens:

***Etherlike Page***




The *Etherlike Page* contains interface statistics. The *Etherlike Page* contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port* — Defines the specific port for which Etherlike statistics are displayed.
  - *LAG* — Defines the specific LAG for which Etherlike statistics are displayed.
- **Refresh Rate** — Defines the amount of time that passes before the interface statistics are refreshed. The possible field values are:
  - *15 Sec* — Indicates that the Etherlike statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the Etherlike statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the Etherlike statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the Etherlike statistics are not refreshed.
- **Frame Check Sequence (FCS) Errors** — Displays the number of FCS errors received on the selected interface.
- **Single Collision Frames** — Displays the number of single collision frames received on the selected interface.
- **Late Collisions** — Displays the number of late collision frames received on the selected interface.

- **Excessive Collisions** — Displays the number of excessive collisions received on the selected interface.
- **Oversize Packets** — Displays the number of oversized packets (over 1518 octets) received on the interface since the device was last refreshed.
- **Internal MAC Receive Errors** — Displays the number of internal MAC received errors on the selected interface
- **Receive Pause Frames** — Displays the number of received paused frames on the selected interface.
- **Transmitted Pause Frames** — Displays the number of paused frames transmitted from the selected interface.

### Resetting Etherlike Statistics Counters

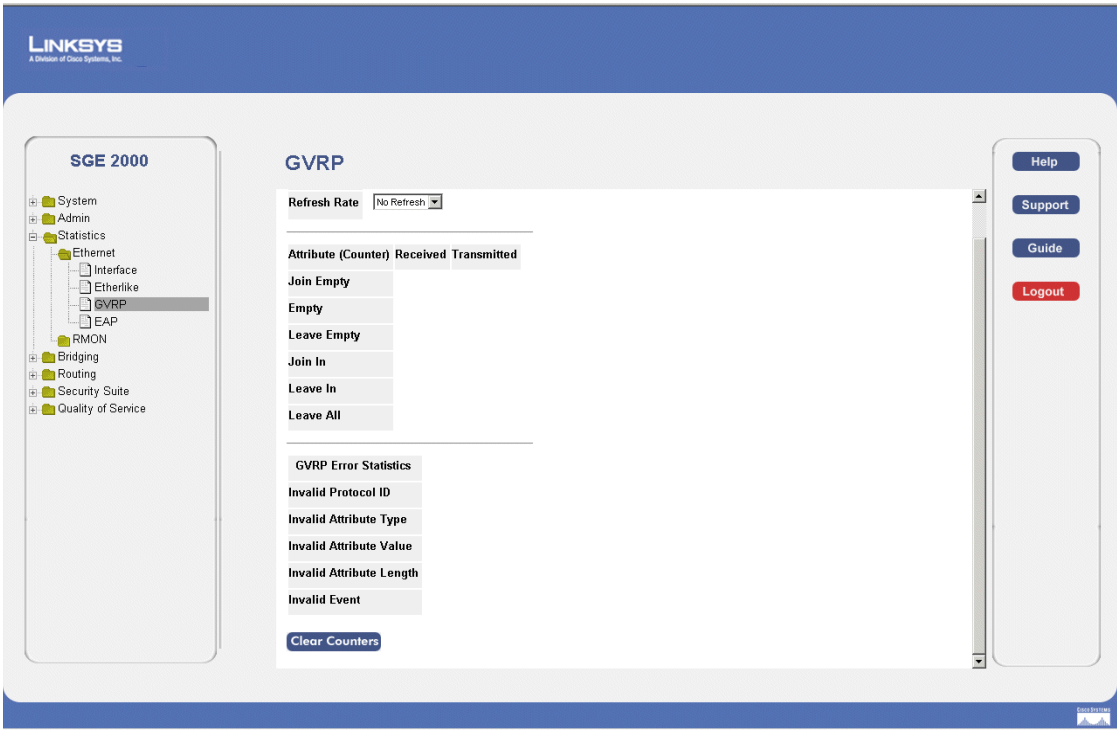
1. Click **Statistics** > **Ethernet** > **Etherlike**. The *Etherlike Page* opens:
2. Click the **Clear Counters** button. The interface statistics counters are cleared.

## Viewing GVRP Statistics

The *GVRP Page* contains device statistics for GVRP. To view GVRP statistics:

1. Click **Statistics > GVRP Statistics**. The *GVRP Page* opens.

***GVRP Page***




The *GVRP Page* contains device statistics for GVRP. The *GVRP Page* is divided into two areas, GVRP Statistics Table and GVRP Error Statistics Table.

The following fields are relevant for both tables:

- **Interface**—Specifies the interface type for which the statistics are displayed.
  - *Port* — Indicates port statistics are displayed.
  - *LAG* — Indicates LAG statistics are displayed.
- **Refresh Rate**—Indicates the amount of time that passes before the GVRP statistics are refreshed. The possible field values are:
  - *15 Sec* — Indicates that the GVRP statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the GVRP statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the GVRP statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the GVRP statistics are not refreshed.

The GVRP Received Transmitted Table contains the following fields:

- **Join Empty** — Displays the device GVRP Join Empty statistics.
- **Empty** — Displays the device GVRP Empty statistics.

- **Leave Empty** — Displays the device GVRP Leave Empty statistics.
- **Join In** — Displays the device GVRP Join In statistics.
- **Leave In** — Displays the device GVRP Leave in statistics.
- **Leave All**— Displays the device GVRP Leave all statistics.

The GVRP Error Statistics Table contains the following fields:

- **Invalid Protocol ID** — Displays the device GVRP Invalid Protocol ID statistics.
- **Invalid Attribute Type** — Displays the device GVRP Invalid Attribute ID statistics.
- **Invalid Attribute Value** — Displays the device GVRP Invalid Attribute Value statistics.
- **Invalid Attribute Length** — Displays the device GVRP Invalid Attribute Length statistics.
- **Invalid Events** — Displays the device GVRP Invalid Events statistics.

### Resetting GVRP Statistics Counters

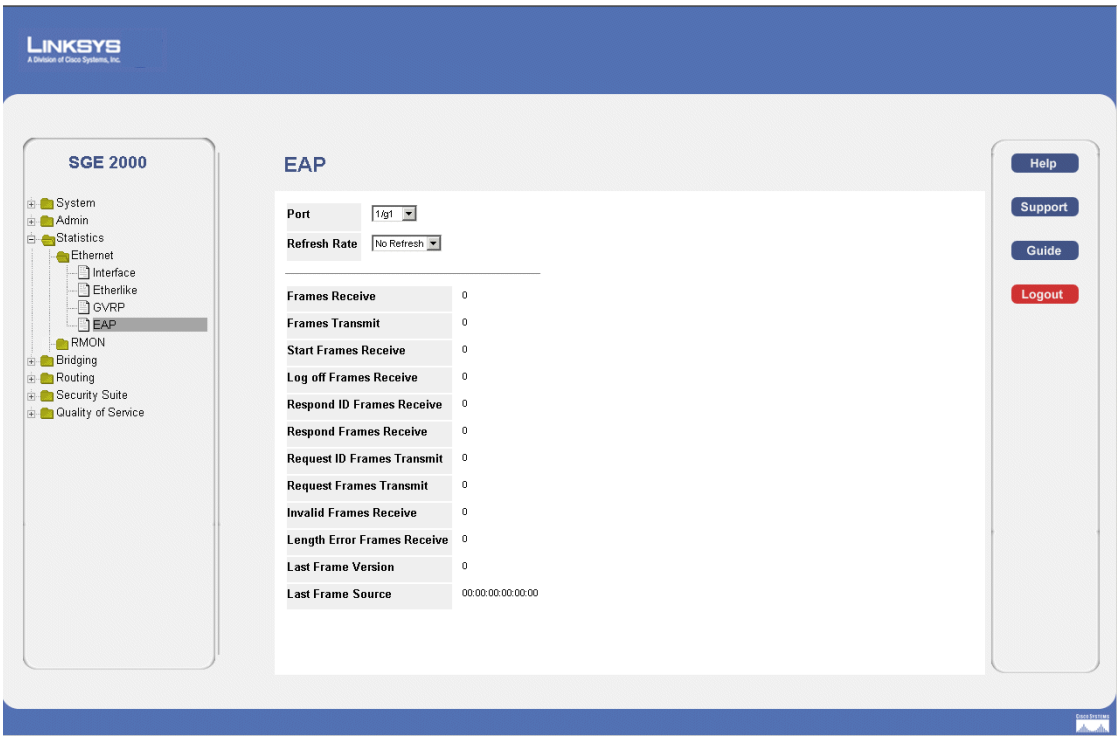
1. Click **Statistics > GVRP Statistics**. The *GVRP Page* opens.
2. Click **Clear Counters**. The GVRP statistics counters are cleared.

## Viewing EAP Statistics

The *EAP Page* contains information about EAP packets received on a specific port. To view the EAP Statistics:

1. Click **Statistics > Ethernet > EAP Statistics**. The *EAP Page* opens.

***EAP Page***




The *EAP Page* contains information about EAP packets received on a specific port. The EAP Page page contains the following fields:

- **Unit Number** — Indicates the stacking member for which the EAP statistics are displayed.
- **Port** — Indicates the port, which is polled for statistics.
- **Refresh Rate** — Defines the amount of time that passes before the interface statistics are refreshed. The possible field values are:
  - *15 Sec* — Indicates that the Etherlike statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the Etherlike statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the Etherlike statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the Etherlike statistics are not refreshed.
- **Frames Receive** — Indicates the number of valid EAPOL frames received on the port.
- **Frames Transmit** — Indicates the number of EAPOL frames transmitted via the port.
- **Start Frames Receive** — Indicates the number of EAPOL Start frames received on the port.
- **Log off Frames Receive** — Indicates the number of EAPOL Logoff frames that have been received on the port.

- **Respond Frames Receive** — Indicates the number of EAP Resp/Id frames that have been received on the port.
- **Request ID Frames Transmit** — Indicates the number of EAP Req/Id frames transmitted via the port.
- **Request Frames Transmit** — Indicates the number of EAP Request frames transmitted via the port.
- **Invalid Frames Receive** — Indicates the number of unrecognized EAPOL frames that have been received by on this port.
- **Length Error Frames Receive** — Indicates the number of EAPOL frames with an invalid Packet Body Length received on this port.
- **Last Frame Version** — Indicates the protocol version number attached to the most recently received EAPOL frame.
- **Last Frame Source** — Indicates the source MAC address attached to the most recently received EAPOL frame.

# Managing RMON Statistics

The RMON section contains the following pages:

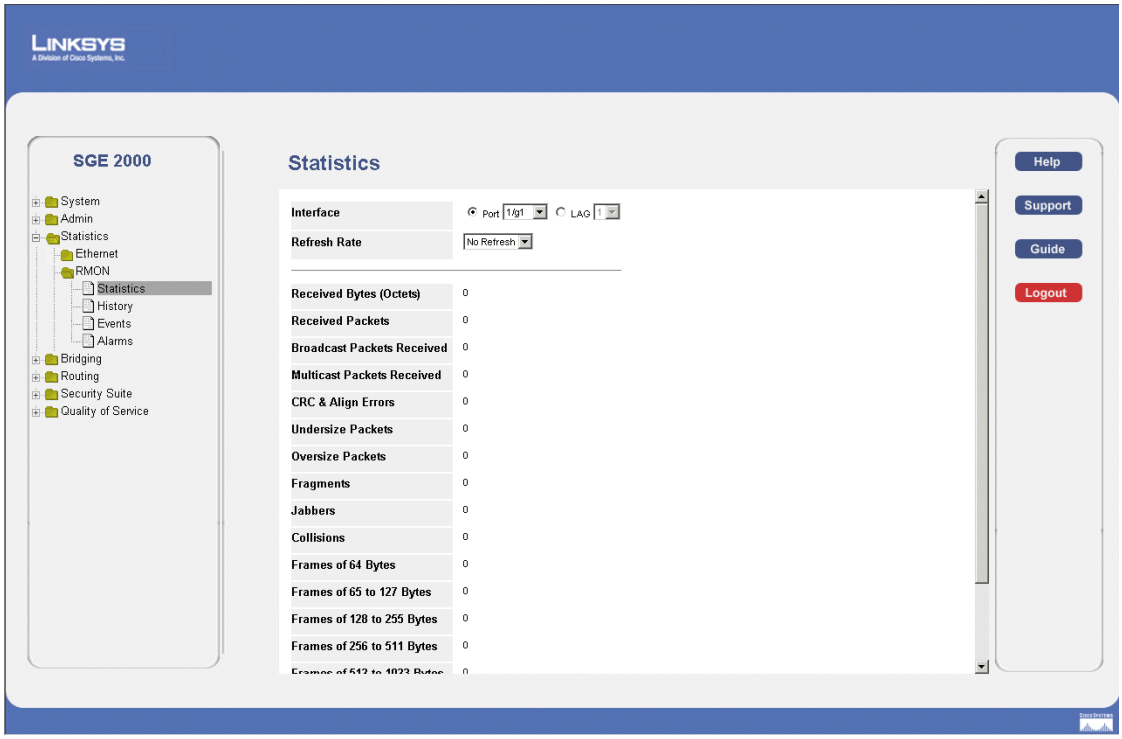
- Viewing RMON Statistics
- Configuring RMON History
- Configuring RMON Events
- Viewing the RMON Events Logs

## Viewing RMON Statistics

The *RMON Statistics Page* contains fields for viewing information about device utilization and errors that occurred on the device. To view the RMON statistics:

1. Click **Statistics** > **RMON** > **Statistics**. The *RMON Statistics Page* opens:

***RMON Statistics Page***




The *RMON Statistics Page* contains fields for viewing information about device utilization and errors that occurred on the device. The *RMON Viewing RMON Statistics* page contains the following fields:

- **Interface** — Indicates the device for which statistics are displayed. The possible field values are:
  - *Port* — Defines the specific port for which RMON statistics are displayed.
  - *LAG* — Defines the specific LAG for which RMON statistics are displayed.
- **Refresh Rate** — Defines the amount of time that passes before the interface statistics are refreshed. The possible field values are:
  - *15 Sec* — Indicates that the RMON statistics are refreshed every 15 seconds.
  - *30 Sec* — Indicates that the RMON statistics are refreshed every 30 seconds.
  - *60 Sec* — Indicates that the RMON statistics are refreshed every 60 seconds.
  - *No Refresh* — Indicates that the RMON statistics are not refreshed.

- **Received Bytes (Octets)** — Displays the number of octets received on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Received Packets** — Displays the number of packets received on the interface, including bad packets, Multicast and broadcast packets, since the device was last refreshed.
- **Broadcast Packets Received** — Displays the number of good broadcast packets received on the interface since the device was last refreshed. This number does not include Multicast packets.
- **Multicast Packets Received** — Displays the number of good Multicast packets received on the interface since the device was last refreshed.
- **CRC & Align Errors** — Displays the number of CRC and Align errors that have occurred on the interface since the device was last refreshed.
- **Undersize Packets** — Displays the number of undersized packets (less than 64 octets) received on the interface since the device was last refreshed.
- **Oversize Packets** — Displays the number of oversized packets (over 1518 octets) received on the interface since the device was last refreshed.
- **Fragments** — Displays the number of fragments (packets with less than 64 octets, excluding framing bits, but including FCS octets) received on the interface since the device was last refreshed.
- **Jabbers** — Displays the total number of received packets that were longer than 1518 octets. This number excludes frame bits, but includes FCS octets that had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral octet (Alignment Error) number. The field range to detect jabbers is between 20 ms and 150 ms.
- **Collisions** — Displays the number of collisions received on the interface since the device was last refreshed.
- **Frames of** xx **Bytes** — Number of *xx*-byte frames received on the interface since the device was last refreshed.

2. Select an interface in the *Interface* field. The RMON statistics are displayed.

## Resetting RMON Statistics Counters

1. Click **Statistics** > **RMON** > **Statistics**. The *RMON Statistics Page* opens:
2. Click the **Reset Counters** button. The RMON statistics counters are cleared.

# Configuring RMON History

This section contains the following topics:

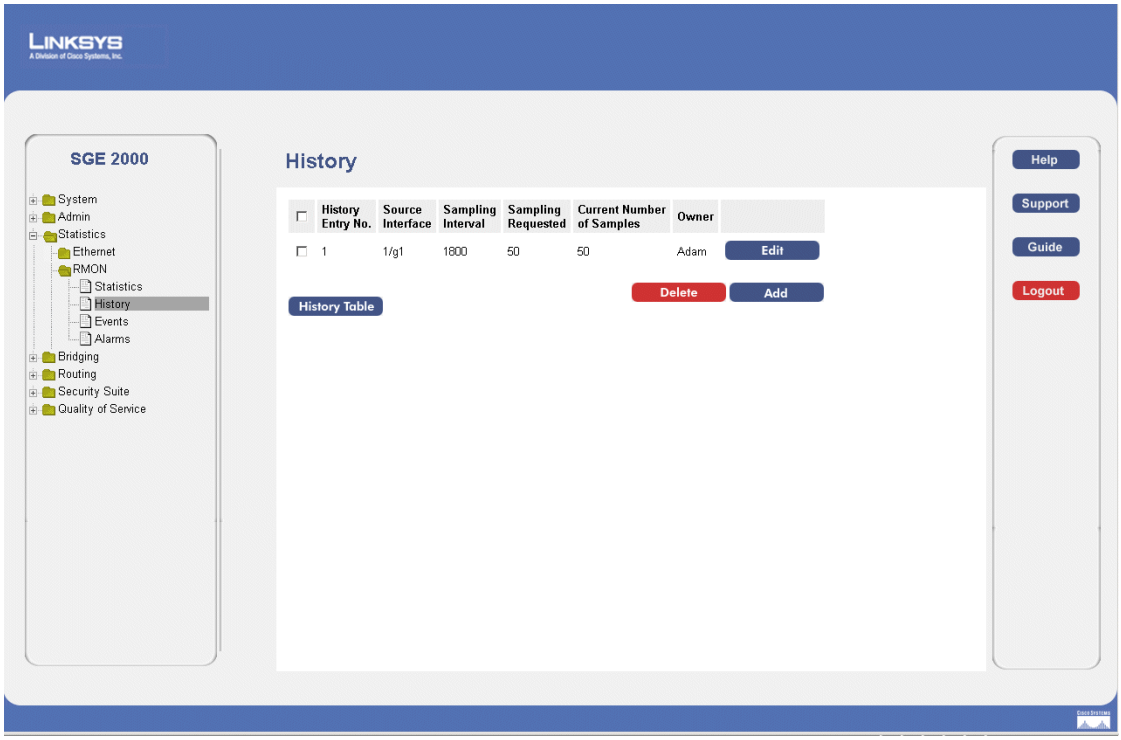
- Defining RMON History Control
- Viewing the RMON History Table

## Defining RMON History Control

The *RMON History Control Page* contains information about samples of data taken from ports. For example, the samples may include interface definitions or polling periods. To view RMON history information:

1. Click **Statistics > RMON > History**. The *RMON History Control Page* opens.

***RMON History Control Page***



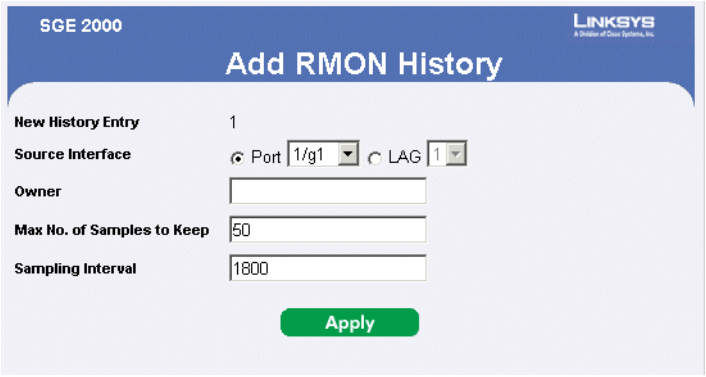

The *RMON History Control Page* contains the following fields:

- **History Entry No.** — Number automatically assigned to the table entry number.
- **Source Interface** — Displays the interface from which the history samples were taken. The possible field values are:
  - *Port* — Specifies the port from which the RMON information was taken.
  - *LAG* — Specifies the port from which the RMON information was taken.

- **Sampling Interval** — Indicates in seconds the time that samplings are taken from the ports. The field range is 1-3600. The default is 1800 seconds (equal to 30 minutes).
- **Sampling Requested** — Displays the number of samples to be saved. The field range is 1-65535. The default value is 50.
- **Current Number of Samples** — Displays the current number of samples taken.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.

3. Click the **Add** button. The *Add RMON History Page* opens:

***Add RMON History Page***




The *Add RMON History Page* contains the following fields:

- **New History Entry** — Number automatically assigned to the table entry number.
- **Source Interface** — Displays the interface from which the history samples were taken. The possible field values are:
  - *Port* — Specifies the port from which the RMON information was taken.
  - *LAG* — Specifies the port from which the RMON information was taken.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.
- **Max No. of Samples to Keep** — Indicates the number of samples to save.
- **Sampling Interval** — Indicates in seconds the time that samplings are taken from the ports. The field range is 1-3600. The default is 1800 seconds (equal to 30 minutes).

4. Define the relevant fields.
5. Click **Apply**. The entry is added to the *RMON History Control Page*, and the device is updated.

*Modify History Control Settings*

1. Click **Statistics > RMON > History**. The *RMON History Control Page* opens.
2. Click the **Edit** button. The *History Control Settings Page* opens:

***History Control Settings Page***

The *History Control Settings Page* contains the following fields:

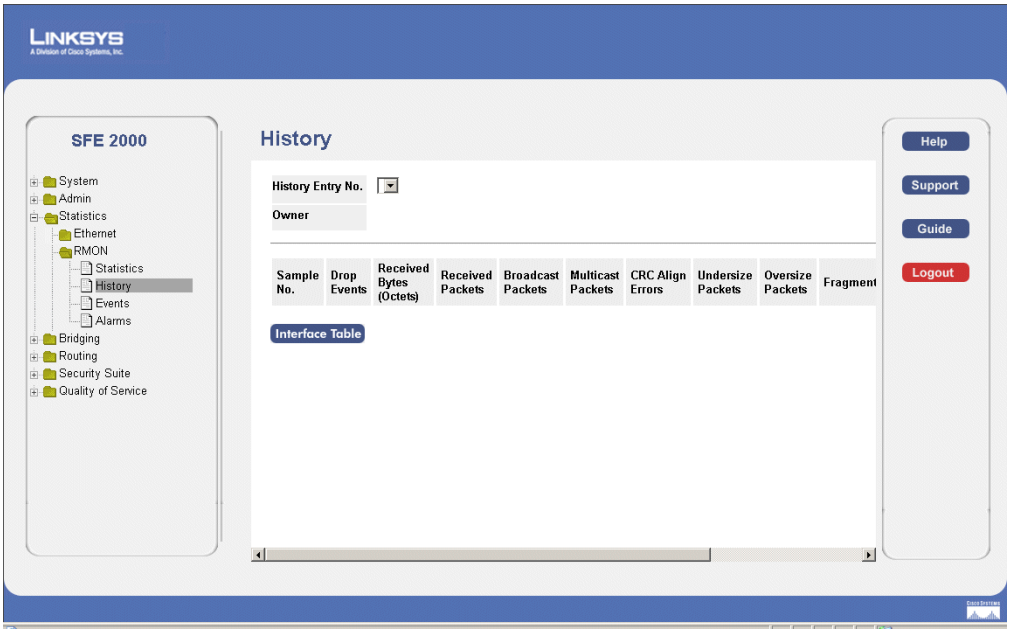
- **History Entry Number** — Displays the entry number for the History Control Table page.
- **Source Interface** — Displays the interface from which the history samples were taken. The possible field values are:
  - *Port* — Specifies the port from which the RMON information was taken.
  - *LAG* — Specifies the port from which the RMON information was taken.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.
- **Max No. of Samples to Keep** — Indicates the number of samples to save.
- **Sampling Interval** — Indicates in seconds the time that samplings are taken from the ports. The field range is 1-3600. The default is 1800 seconds (equal to 30 minutes).

3. Define the relevant fields.
4. Click **Apply**. The history control settings are defined, and the device is updated.

## Viewing the RMON History Table

1. Click **Statistics > RMON > History**. The *RMON History Control Page* opens:
2. Click the **History Table** button. The *RMON History Table Page* opens:

***RMON History Table Page***




The *RMON History Table Page* contains the following fields:

- **History Entry No.** — Displays the entry number for the History Control Table page.
- **Owner** — Displays the RMON station or user that requested the RMON information. The field range is 0-20 characters.
- **Sample No. —** Indicates the sample number from which the statistics were taken.
- **Drop Events —** Indicates the number of dropped packets due to lack of network resources during the sampling interval. This may not represent the exact number dropped packets, but rather the number of times dropped packets were detected.
- **Received Bytes (Octets)** — Displays the number of octets received on the interface since the device was last refreshed. This number includes bad packets and FCS octets, but excludes framing bits.
- **Received Packets** — Displays the number of packets received on the interface since the device was last refreshed, including bad packets, Multicast and Broadcast packets.
- **Broadcast Packets** — Displays the number of good Broadcast packets received on the interface since the device was last refreshed. This number does not include Multicast packets.
- **Multicast Packets** — Displays the number of good Multicast packets received on the interface since the device was last refreshed.

- **CRC Align Errors** — Displays the number of CRC and Align errors that have occurred on the interface since the device was last refreshed.
- **Undersize Packets** — Displays the number of undersized packets (less than 64 octets) received on the interface since the device was last refreshed.
- **Oversize Packets** — Displays the number of oversized packets (over 1518 octets) received on the interface since the device was last refreshed.
- **Fragments** — Displays the number of fragments (packets with less than 64 octets, excluding framing bits, but including FCS octets) received on the interface since the device was last refreshed.
- **Jabbers** — Displays the total number of received packets that were longer than 1518 octets. This number excludes frame bits, but includes FCS octets that had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral octet (Alignment Error) number. The field range to detect jabbers is between 20 ms and 150 ms.
- **Collisions** — Displays the number of collisions received on the interface since the device was last refreshed.
- **Utilization** — Displays the percentage of the interface utilized.

## Configuring RMON Events

This section includes the following topics:

- Defining RMON Events Control
- Viewing the RMON Events Logs

### Defining RMON Events Control

The *RMON Events Page* contains fields for defining RMON events. To view RMON events:

1. Click **Statistics > RMON > Events**. The *RMON Events Page* opens:

***RMON Events Page***

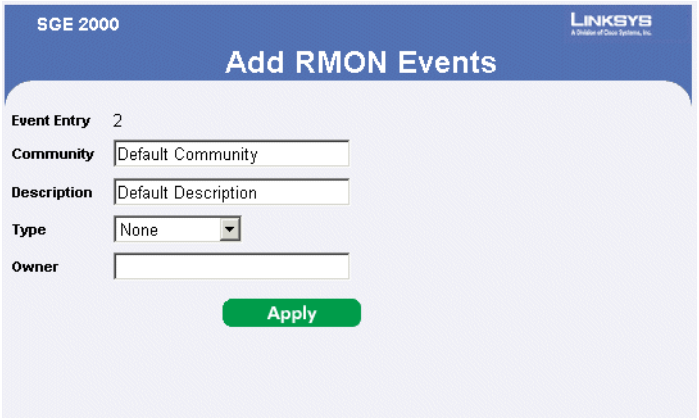
The *RMON Events Page* contains fields for defining RMON events. The *RMON RMON Events Page* page contains the following fields:

- **Event Entry** — Displays the event.
- **Community** — Displays the community to which the event belongs.
- **Description** — Displays the user-defined event description.
- **Type** — Describes the event type. Possible values are:
  - *None* — Indicates that no event occurred.
  - *Log* —Indicates that the event is a log entry.
  - *Trap* — Indicates that the event is a trap.
  - *Log and Trap* — Indicates that the event is both a log entry and a trap.
- **Time** — Displays the time that the event occurred.
- **Owner** — Displays the device or user that defined the event.

The **Add to List** button adds the configured RMON event to the Event Table at the bottom of the page.

2. Click the **Add** button. The *Add RMON Events Page* opens:

***Add RMON Events Page***




The *Add RMON Events Page* contains the following fields:

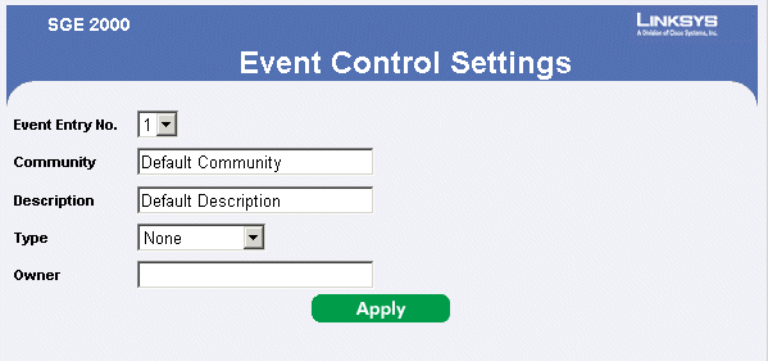
- **Event Entry** — Displays the event.
- **Community** — Displays the community to which the event belongs.
- **Description** — Displays the user-defined event description.
- **Type** — Describes the event type. Possible values are:
  - *None* — Indicates that no event occurred.
  - *Log* —Indicates that the event is a log entry.
  - *Trap* — Indicates that the event is a trap.
  - *Log and Trap* — Indicates that the event is both a log entry and a trap.
- **Owner** — Displays the device or user that defined the event.

3. Define the relevant fields.
4. Click **Apply**. The RMON event is added, and the device is updated.

*Modify Event Control Settings*

1. Click **Statistics > RMON > Events**. The *RMON Events Page* opens:
2. Click **Edit**. The *Modify Event Control Settings Page* opens:

*Modify Event Control Settings Page*




The *Modify Event Control Settings Page* contains the following fields:

- **Event Entry** — Displays the event.
- **Community** — Displays the community to which the event belongs.
- **Description** — Displays the user-defined event description.
- **Type** — Describes the event type. Possible values are:
  - *None* — Indicates that no event occurred.
  - *Log* —Indicates that the event is a log entry.
  - *Trap* — Indicates that the event is a trap.
  - *Log and Trap* — Indicates that the event is both a log entry and a trap.
- **Owner** — Displays the device or user that defined the event.

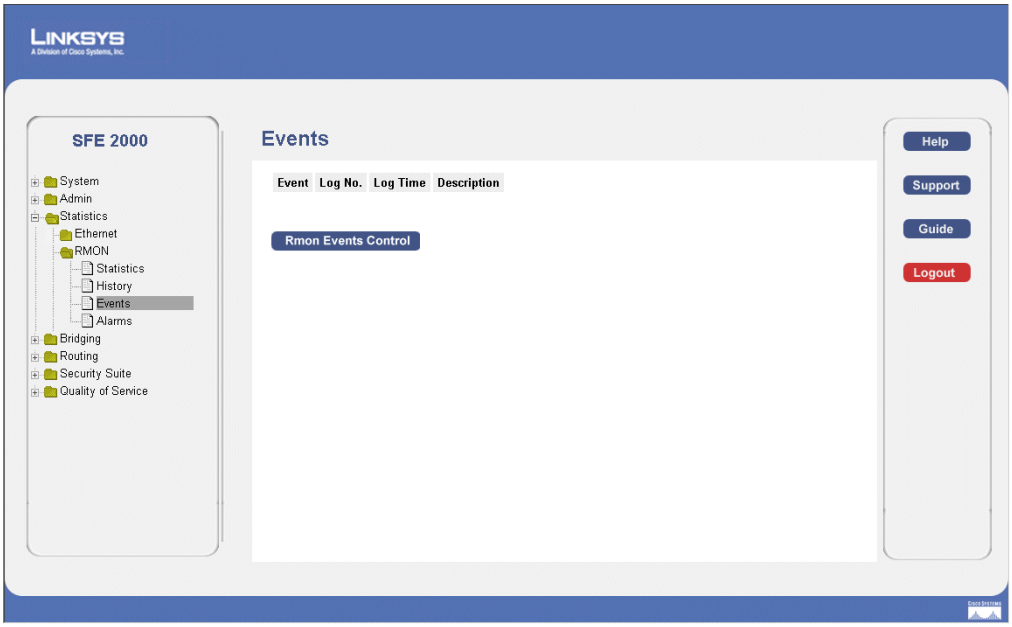
3. Define the relevant fields.
4. Click **Apply.** The event control settings are modified. and the device is updated.

### Viewing the RMON Events Logs

The RMON Events page contains fields for defining RMON events.

1. Click **Statistics > RMON > Events.** The *Events Page* opens:
2. Click the **Events Log** button**.** The *Events Page* opens:

***Events Page***




The *Events Page* contains the following fields:

- **Event** — Displays the RMON Events Log entry number.
- **Log No.—** Displays the log number.
- **Log Time** — Displays the time when the log entry was entered.
- **Description** — Displays the log entry description.

## Defining RMON Alarms

The *RMON Alarms Page* contains fields for setting network alarms. Network alarms occur when a network problem, or event, is detected. Rising and falling thresholds generate events. To set RMON alarms:

1. Click **Statistics** > **RMON** > **Alarms**. The *RMON Alarms Page* opens:

***RMON Alarms Page***

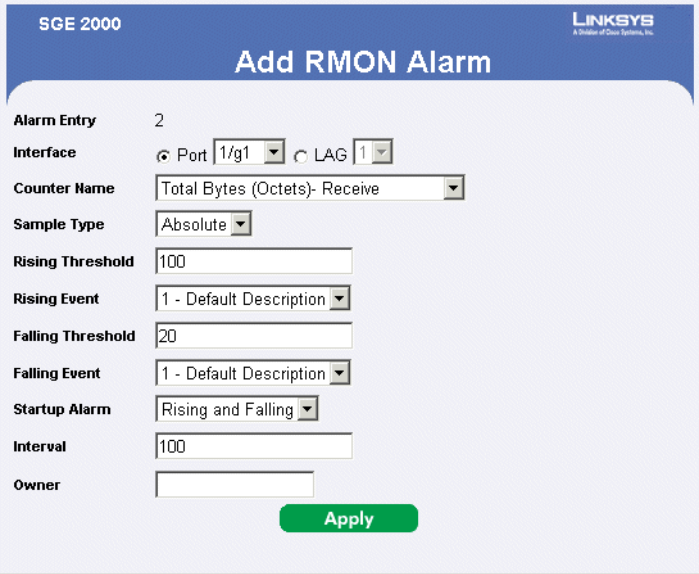
The *RMON Alarms Page* contains the following fields:

- **Alarm Entry** — Indicates a specific alarm.
- **Counter Name** — Displays the selected MIB variable.
- **Interface** — Displays the interface for which RMON statistics are displayed. The possible field v values are:
  - *Port* — Displays the RMON statistics for the selected port.
  - *LAG* — Displays the RMON statistics for the selected LAG.
- **Counter Value** — Displays the current counter value for the particular alarm.
- **Sample Type** — Defines the sampling method for the selected variable and comparing the value against the thresholds. The possible field values are:
  - *Delta* — Subtracts the last sampled value from the current value. The difference in the values is compared to the threshold.
  - *Absolute* — Compares the values directly with the thresholds at the end of the sampling interval.
- **Rising Threshold** — Displays the rising counter value that triggers the rising threshold alarm. The rising threshold is presented on top of the graph bars. Each monitored variable is designated a color.

- **Rising Event —** Selects an event which is defined in the Events table that triggers the rising threshold alarm. The Events Table is displayed in the RMON Events page.
- **Falling Threshold** — Displays the falling counter value that triggers the falling threshold alarm. The falling threshold is graphically presented on top of the graph bars. Each monitored variable is designated a color.
- **Falling Event** — Selects an event which is defined in the Events table that triggers the falling threshold alarm. The Events Table is displayed in the RMON Events page.
- **Startup Alarm** — Displays the trigger that activates the alarm generation. Rising is defined by crossing the threshold from a low-value threshold to a higher-value threshold.
- **Interval** — Defines the alarm interval time in seconds.
- **Owner** — Displays the device or user that defined the alarm.

2. Click the **Add** button. The Add RMON Alarm Page opens:

***Add RMON Alarm Page***




The *Add RMON Alarm Page* contains the following fields:

- **Alarm Entry** — Indicates a specific alarm.
- **Interface** — Displays the interface for which RMON statistics are displayed. The possible field v values are:
  - *Port* — Displays the RMON statistics for the selected port.
  - *LAG* — Displays the RMON statistics for the selected LAG.
- **Counter Name** — Displays the selected MIB variable.

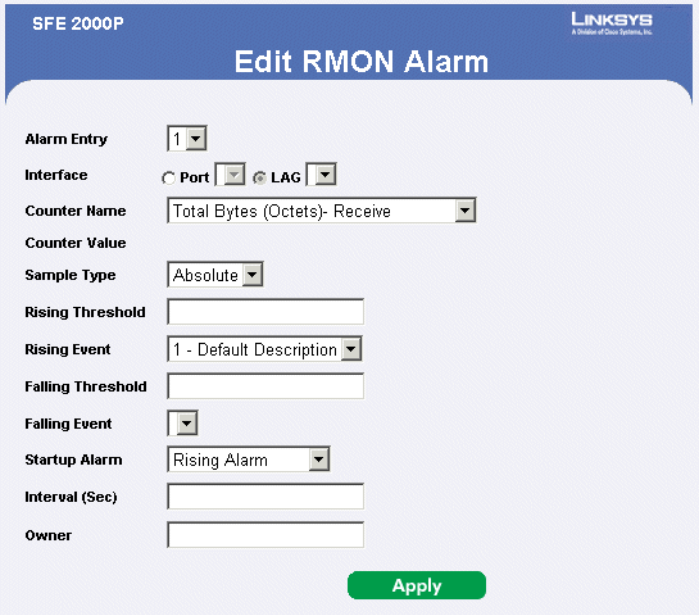
- **Sample Type** — Defines the sampling method for the selected variable and comparing the value against the thresholds. The possible field values are:
  - *Delta* — Subtracts the last sampled value from the current value. The difference in the values is compared to the threshold.
  - *Absolute* — Compares the values directly with the thresholds at the end of the sampling interval.
- **Rising Threshold** — Displays the rising counter value that triggers the rising threshold alarm. The rising threshold is presented on top of the graph bars. Each monitored variable is designated a color.
- **Rising Event —** Selects an event which is defined in the Events table that triggers the rising threshold alarm. The Events Table is displayed in the RMON Events page.
- **Falling Threshold** — Displays the falling counter value that triggers the falling threshold alarm. The falling threshold is graphically presented on top of the graph bars. Each monitored variable is designated a color.
- **Falling Event** — Selects an event which is defined in the Events table that triggers the falling threshold alarm. The Events Table is displayed in the RMON Events page.
- **Startup Alarm** — Displays the trigger that activates the alarm generation. Rising is defined by crossing the threshold from a low-value threshold to a higher-value threshold.
- **Interval** — Defines the alarm interval time in seconds.
- **Owner** — Displays the device or user that defined the alarm.

3. Define the relevant fields.
4. Click **Apply**. The RMON alarm is added, and the device is updated.

*Modify RMON Alarm Settings*

1. Click **Statistics** > **RMON** > **Alarms**. The *RMON Alarms Page* opens:
2. Click the **Edit** Button. The *Edit RMON Alarms Page* opens:

***Edit RMON Alarms Page***




The *Edit RMON Alarms Page* contains the following fields:

- **Alarm Entry** — Indicates a specific alarm.
- **Interface** — Displays the interface for which RMON statistics are displayed. The possible field v values are:
  - *Port* — Displays the RMON statistics for the selected port.
  - *LAG* — Displays the RMON statistics for the selected LAG.
- **Counter Name** — Displays the selected MIB variable.
- **Counter Value** — Displays the current counter value for the particular alarm.
- **Sample Type** — Defines the sampling method for the selected variable and comparing the value against the thresholds. The possible field values are:
  - *Delta* — Subtracts the last sampled value from the current value. The difference in the values is compared to the threshold.
  - *Absolute* — Compares the values directly with the thresholds at the end of the sampling interval.
- **Rising Threshold** — Displays the rising counter value that triggers the rising threshold alarm. The rising threshold is presented on top of the graph bars. Each monitored variable is designated a color.
- **Rising Event —** Selects an event which is defined in the Events table that triggers the rising threshold alarm. The Events Table is displayed in the RMON Events page.

- **Falling Threshold** — Displays the falling counter value that triggers the falling threshold alarm. The falling threshold is graphically presented on top of the graph bars. Each monitored variable is designated a color.
- **Falling Event** — Selects an event which is defined in the Events table that triggers the falling threshold alarm. The Events Table is displayed in the RMON Events page.
- **Startup Alarm** — Displays the trigger that activates the alarm generation. Rising is defined by crossing the threshold from a low-value threshold to a higher-value threshold.
- **Interval** — Defines the alarm interval time in seconds.
- **Owner** — Displays the device or user that defined the alarm

3. Define the relevant fields.
4. Click **Apply**. The RMON alarms are modified, and the device is updated.

# Managing Device Diagnostics

This section contains information for configuring port mirroring, running cable tests, and viewing device operational information, and includes the following topics:

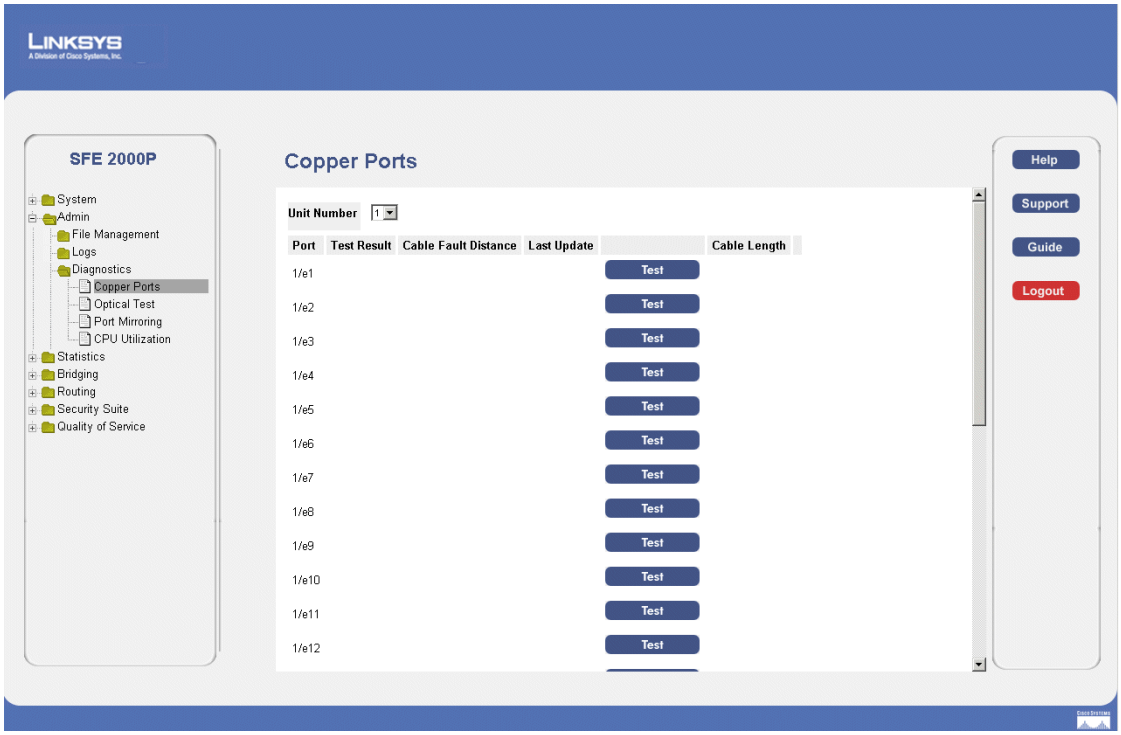
- Viewing Integrated Cable Tests
- Performing Optical Tests
- Configuring Port Mirroring
- Defining CPU Utilization

## Viewing Integrated Cable Tests

The *Copper Ports Page* contains fields for performing tests on copper cables. Cable testing provides information about where errors occurred in the cable, the last time a cable test was performed, and the type of cable error that occurred. The tests use Time Domain Reflectometry (TDR) technology to test the quality and characteristics of a copper cable attached to a port. Cables up to 120 meters long can be tested. Cables are tested when the ports are in the down state, with the exception of the Approximated Cable Length test. To test cables:

1. Click **Admin** > **Diagnostics** > **Copper Ports**. The *Copper Ports Page* opens:

***Copper Ports Page***



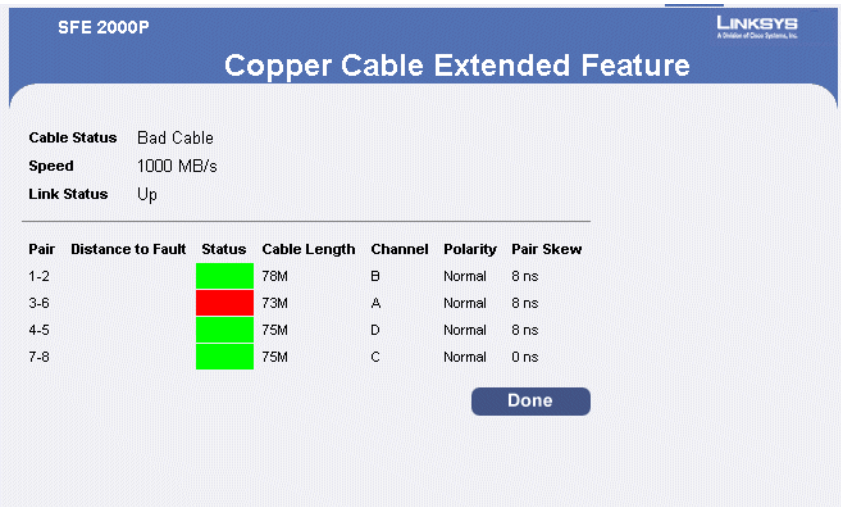

The *Copper Ports Page* contains the following fields:

- **Unit No.** — Indicates the unit number on which the tests are performed.

- **Port** — Specifies port to which the cable is connected.
- **Test Result** — Displays the cable test results. Possible values are:
  - *No Cable* — Indicates that a cable is not connected to the port.
  - *Open Cable* — Indicates that a cable is connected on only one side.
  - *Short Cable* — Indicates that a short has occurred in the cable.
  - *OK* — Indicates that a cable passed the test.
- **Cable Fault Distance** — Indicates the distance from the port where the cable error occurred.
- **Last Update** — Indicates the last time the port was tested.
- **Cable Length** — Indicates the approximate cable length. This test can only be performed when the port is up and operating at 1 Gbps.

2. Click the **Advanced** button. The *Copper Cable Extended Feature Page* opens:

***Copper Cable Extended Feature Page***




The *Copper Cable Extended Feature Page* contains the following fields.

- **Cable Status** — Displays the cable status.
- **Speed** — Indicates the speed at which the cable is transmitting packets.
- **Link Status** — Displays the current link status.
- **Pair** — The pair of cables under test.
- **Distance to Fault** — Indicates the distance from the port where the cable error occurred.
- **Status** — Displays the cable status.

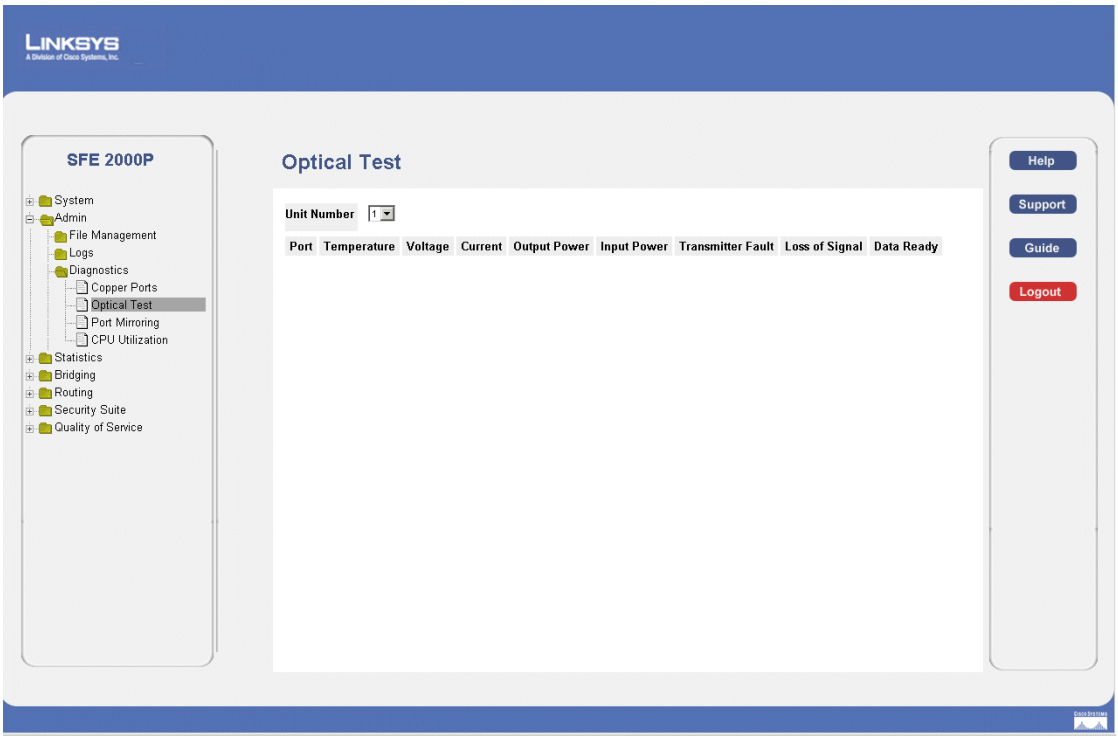
- **Cable length** — Displays the cable length.
- **Channel** — Displays the cable's channel.
- **Polarity** — Automatic polarity detection and correction permits on all RJ-45 ports for automatic adjustment of wiring errors.
- **Pair Skew** — Reaction or transmission time in nanoseconds for the selected cable pair and given cable length.

3. Define the relevant fields.
4. Click **Apply**. The advanced copper cable settings are defined, and the device is updated.

## Performing Optical Tests

The *Optical Test Page* allows network managers to perform tests on Fiber Optic cables. Optical transceiver diagnostics can be performed only when the link is present. During the port test, the port moves to a down state.

***Optical Test Page***




The *Optical Test Page* contains the following fields:

- **Port** — Displays the port IP address on which the cable is tested.
- **Temperature** — Displays the temperature (C) at which the cable is operating.
- **Voltage** — Displays the voltage at which the cable is operating.

- **Current** — Displays the current at which the cable is operating.
- **Output Power** — Indicates the rate at which the output power is transmitted.
- **Input Power** — Indicates the rate at which the input power is transmitted.
- **Transmitter Fault** — Indicates if a fault occurred during transmission.
- **Loss of Signal** — Indicates if a signal loss occurred in the cable.
- **Data Ready** — Indicates the data status.

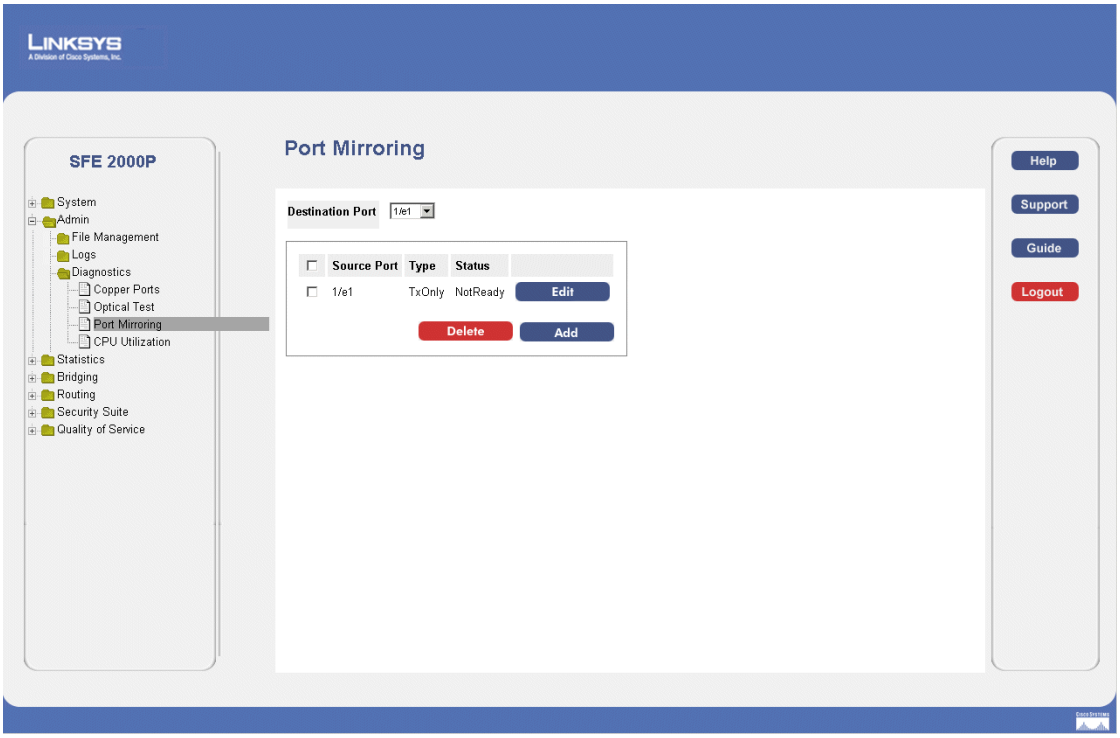
## Configuring Port Mirroring

Configuring Port Mirroring monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from one port to a monitoring port. Port mirroring can be used as diagnostic tool and/or a debugging feature. Port mirroring also enables switch performance monitoring.

Network administrators configure port mirroring by selecting a specific port to copy all packets, and different ports from which the packets are copied. To enable port mirroring:

1. Click **Admin** > **Diagnostics** > **Port Mirroring**. The *Configuring Port Mirroring Page* opens:

***Configuring Port Mirroring Page***



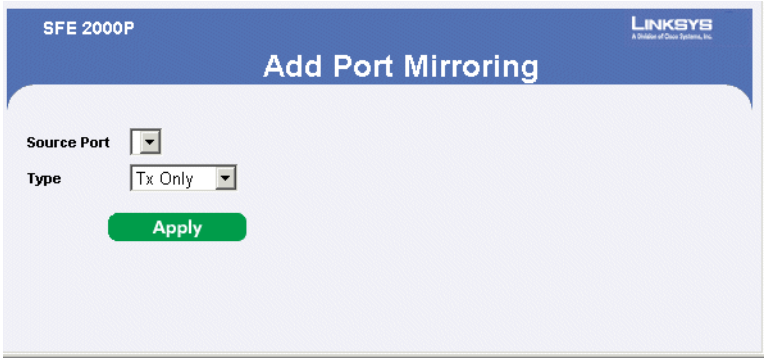

The *Configuring Port Mirroring Page* contains the following fields:

- **Source Port** — Defines the port from which traffic is mirrored.

- **Destination Port** — Defines the port to which traffic is mirrored.
- **Type** — Indicates the port mode configuration for port mirroring. The possible field values are:
  - *RxOnly* — Defines the port mirroring on receiving ports. This is the default value.
  - *TxOnly* — Defines the port mirroring on transmitting ports.
  - *Tx and Rx*— Defines the port mirroring on both receiving and transmitting ports.
- **Status** — Indicates if the port is currently monitored. The possible field values are:
  - *Active* — Indicates the port is currently monitored.
  - *notReady* — Indicates the port is not currently monitored.

2. Click the **Add** button. The *Add Port Mirroring Page* opens:

***Add Port Mirroring Page***




The *Add Port Mirroring Page* contains the following fields:

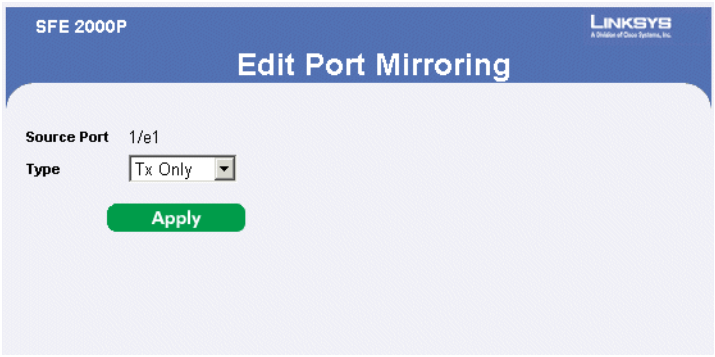
- **Source Port** — Defines the port to which traffic is mirrored.
- **Type** — Indicates the port mode configuration for port mirroring. The possible field values are:
  - *RxOnly* — Defines the port mirroring on receiving ports. This is the default value.
  - *TxOnly* — Defines the port mirroring on transmitting ports.
  - *Tx and Rx* — Defines the port mirroring on both receiving and transmitting ports.

3. Define the relevant fields.
4. Click **Apply**. Port mirroring is added, and the device is updated.

*Modifying Port Mirroring*

1. Click **Admin** > **Diagnostics** > **Port Mirroring**. The *Configuring Port Mirroring Page* opens:
2. Click the **Edit** Button. The *Edit Port Mirroring Page* opens:

***Edit Port Mirroring Page***




The *Edit Port Mirroring Page* contains the following fields:

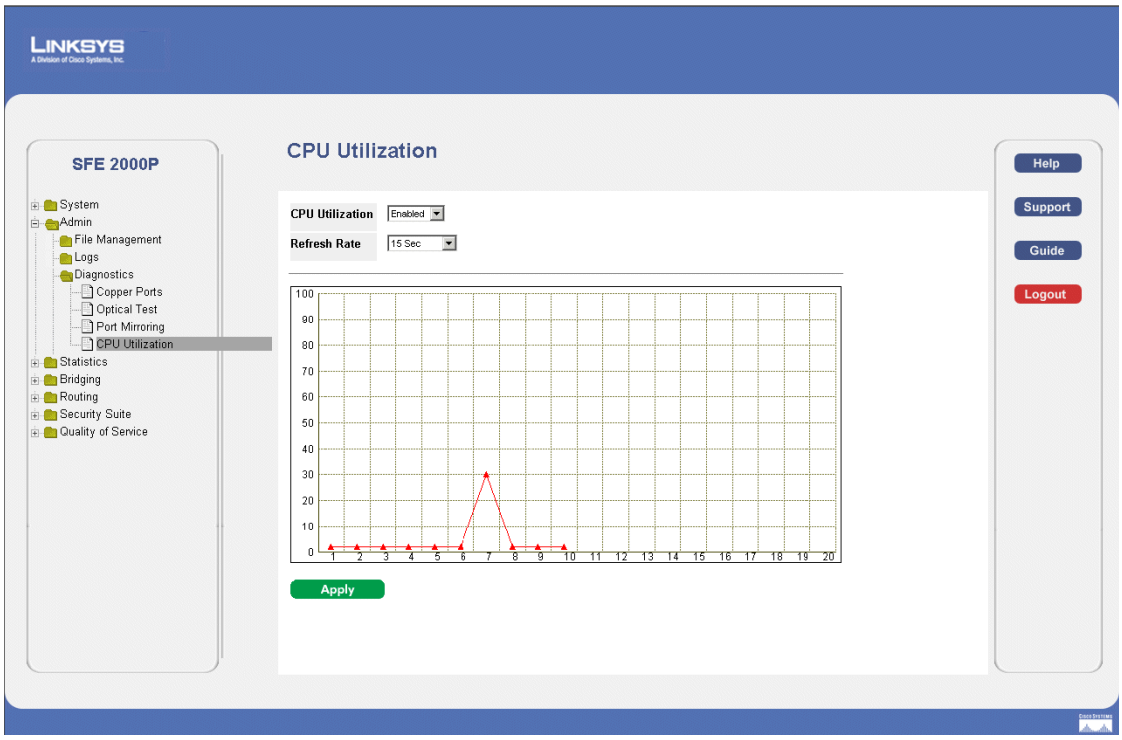
- **Source Port** — Defines the port to which traffic is mirrored.
- **Type** — Indicates the port mode configuration for port mirroring. The possible field values are:
  - *RxOnly* — Defines the port mirroring on receiving ports. This is the default value.
  - *TxOnly* — Defines the port mirroring on transmitting ports.
  - *Tx and Rx*— Defines the port mirroring on both receiving and transmitting ports.

3. Define the relevant fields.
4. Click **Apply**. The Port mirroring is modified, and the device is updated.

## Defining CPU Utilization

The *CPU Utilization Page* contains information about the system's CPU utilization.

***CPU Utilization Page***




The *CPU Utilization Page* contains the following fields:

- **CPU Utilization** — Displays CPU resource utilization information. The possible field values are:
  - *Enabled* — Enables viewing CPU utilization information. This is the default value.
  - *Disabled* — Disables viewing the CPU utilization information.
- **Refresh Rate** — Amount of time that passes before the statistics are refreshed.
- **Usage Percentages** — Indicates the percentage of the CPU's resources consumed by the device.
- **Time** — Indicates the time, in 15 second intervals, the usage samples are taken.

# Linksys One Contact Information

Need to contact Linksys One?

Visit us online for information on the latest products and updates to your existing products at:

http://www.linksys.com/international

If you experience problems with any Linksys product, you can e-mail us at:

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| France | support.fr@linksys.com |
| Germany | support.de@linksys.com |
| Greece | support.gr@linksys.com (English only) |
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| UAE | support.ae@linksys.com (English only) |
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